

ENHANCING THE DEVELOPMENT OF TRAFFIC PSYCHOLOGY IN THE CZECH REPUBLIC

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Two years of co-operation between Department of Psychology, Palacký University in Olomouc, the Centre for Traffic Research CDV in Brno, and FACTUM Traffic and Social Analyses in Vienna

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Prologue

Tens of thousands of fatalities and hundreds of thousands more people being injured on European roads every year pose an enormous and, unfortunately, ever-growing problem for society as a whole. Rather than a necessary toll we pay for our freedom of mobility, it is a real tragedy that occurs in front of our eyes day after day. Do we ask why and what we can do differently? How are we to fulfil the Vision Zero Initiative, which finds road fatalities unacceptable? Is it safer cars, better infrastructure, enforcement of the rules, stricter sanctions, education and training of drivers, respect for the law? Every measure that we adopt in an effort to contribute to a greater safety on European roads involves an inherent psychological aspect. I am convinced that if we want our efforts to be really successful and the measures we adopt effective, we need to take the factor of human behaviour and its impact very seriously.

Olga Sehnalová, M.D.

Member of the European Parliament

Introduction

In 2012, traffic scientist from the University of Olomouc and from CDV decided to initiate a mentoring in order to get impulses for further development of traffic psychology in the Czech Republic. The goal was to take the help of a senior researcher, who had been working in the area for many years and in different countries, thus collecting rich knowledge in the field, not only concerning research findings and respective literature, but also concerning practice, policies and procedures in different countries in the EU and outside the EU. Such knowledge is often documented in grey literature or just a matter of discussion or agreement among researchers and can only be accrued by experience over a longer time. If the information about these issues has not been systematically collected and summarised, new experiences have to be made, which may take a very long time and also may mean to "reinvent the wheel" in certain respects.

From this perspective Dr. Ralf Risser, lecturer ("Dozent") for Traffic Sociology at the University of Vienna (Institute of Sociology, and at the Technical University, Institute for Traffic Planning and Engineering), Adjunct professor at the University of Lund, Institute of Technology and Society (2005 – 2013) and director of the private research institute FACTUM in Vienna as well as registered Traffic Psychologist according to Austrian law (FSG-GV)¹ was approached if he could do the job. After two pilot sessions in Brno and Olomouc in October and December 2012, a contract between the Department of Psychology of the Palacký University in Olomouc and Dr. Risser was written and signed. It was agreed that ten one-day sessions at alternating sites – once in Vienna and once in Olomouc or Brno – should take place. A general and very open plan was set up, where it was decided that after each session the detailed topics for the next session should be formulated. The structure should remain similar for every session, comprising

1. Presentation of theses, papers or other activities of the participants at the mentoring;
2. Discussion and, if possible, preparation of potential common projects;
3. Preparation and submission of articles to scientific journals
4. Presentations concerning selected topics by the mentor Ralf Risser;
5. Discussion of the scope of traffic psychology along with other activities that should culminate in a paper dedicated to this topic (as presented in this report).

By the end of 2013, the decision was made to ask for sponsoring for one more year of mentoring, and this time CDV took over the financing for the meetings and the work of the mentor. In 2014, the cooperation continued as in the year before and at the end of 2014 the task was set to write a report about these 2 years of mentoring.

¹ §20 Führerscheingesetz–Gesundheitsverordnung FSG-GV

Theses and activities – progress and state

The participants presented their work, followed by a feedback of the mentor and discussion in the group. Notes were taken and the feedback and comments were considered and incorporated in the further work. The activities included the following:

Kateřina Böhmová

This work focused on describing the interview as a method used in the TPA (Traffic Psychological Assessment). The reason for describing this method was the need to understand the form, content and overlap of the interview process. The demand for the exact description arose from the lack of (a set of) standardized questions which would serve better for the purpose of differentiation between an assessment interview and interview used in traffic psychology. Traffic psychologists confirmed the absence of such tool and demanded similar studies which will facilitate not only the work for novice transport psychologists in this field, but also explain and instruct how an interview should be conducted, reviewed and compared. Traffic psychologists largely miss a standardized form of interview which allows for a final and unambiguous diagnosis that will permanently assess whether the client is able to drive motor vehicles or not; the current status quo allows space for doubt as it is possible to receive two opposing outcomes from the testing: after one interview the client can be diagnosed as unfit to drive, while in another interview the same client can be found fit to drive.

The research focused on traffic psychology and leadership-style interview in the TPA in order to describe the form of the interview. Data collected from 15 respondents were the basis for the interview analysis. All respondents had to be traffic psychologists and members of the Association of Czech traffic psychologists, and had to be currently familiar with the practice in TPA. The research sought answers to pre-established five research questions:

- What are the common variables of the interview within the TPA?
- What are the formal procedures for conducting interviews within the TPA?
- What are the primary topics and the contents of the interviews within the TPA?
- What is the purpose of the interview within the TPA?

Since this was a descriptive study, the chosen design was purely qualitative, while a descriptive analyze has been used. As a method of data collection, a semi-structured interview was chosen. The intended result of this descriptive study was to identify and outline the problems of the TPA interviews in the Czech Republic. Because of the non-standardized form of the interview, discrepancies between different traffic psychologists frequently occur. The results helped to understand the TPA in the Czech Republic. The research raised questions which could inspire and ignite other research and, finally, a form of standardized interview that covers all issues and serves all can be created.

Darina Havlíčková

The main goal was an outline of a PhD-thesis during the mentoring. The thesis focuses on psychosomatic problems and psychological and psychosocial well-being of public transport drivers after traffic accident. The research was gradually planned in two areas, qualitatively and quantitatively, following the literature review. The aim of the quantitative part was to explore the legitimacy of psychological work in the field of post-accident care for public transport drivers. The quantitative part was based on the following assumptions: 1) urban transport drivers suffer from higher level of psychosomatic problems; 2) after motor vehicle accident, drivers of public transport vehicles suffer from higher level of psychosomatic problems; 3) inconclusive results require a focus on subjectivity (guilt and level of stress) and possible intervening variables (personality, gender, years in service). Data were collected by a questionnaire. A new psychosomatic questionnaire (based on literature review) was created during the mentoring. The questionnaire included four general areas: 1/digestive disorders, 2/rheumatic disorders, 3/fatigue and 4/supplementary questions (headache etc.). Preliminary results underline the importance of the role of guilt and subjective assessment of the severity of the accident, the role of personality (Big Five) and years of service. The aim of the qualitative part was to obtain a base for the development of a therapeutic program for urban transport drivers. The use of interpretative phenomenological analysis, focusing on the analysis of needs and motives, was discussed. Also, data collection via narrative interview was considered. The list of questions for the interview was compiled during the mentoring. The originated interview focused on three areas: 1) perceived support from employers and closer and broader social environment, 2) persisting consequences with a focus on psychosomatic problems, and 3) coping strategies used in the field of psychosomatic problems. The possibility of data publishing was also discussed.

Veronika Kuřečková

Psychological aspects providing first aid by lay persons – in the Czech Republic, the theme has never been systematically researched before. There is a focus on the medical point of view, but there is a lack of interest in the psychological aspects of the first aid provision.

The work started with a thorough literature review for which theoretical and empirical studies from medicine, pedagogy and psychology were collected. A qualitative pilot study with 10 first aid providers was conducted to obtain a better knowledge about the processes during and after the first aid provision. The problem of trauma from first aid providing was examined too.

Firstly, a contact with the Czech emergency medicine experts was established. Dr. Brazdil, emergency medicine specialist and a member of Czech parliament, was involved in a close cooperation and became a core member of the team that prepared a project for the Ministry of interior (Experience-based methods of the first aid training as a part of the education and development of children and adolescents - *Metody založene na zkušenostech*

z treningu první pomoci při výchově a rozvoji dětí a mládeže). Further cooperation and projects are planned. Dr. Breckwold from the Berlin Charite Institute keeps in touch and provides data, new articles and information. A membership in the Czech Resuscitation Council was acquired in 2014; this proved useful for new contacts and connections.

A short first aid training became a part of rehabilitation programs for traffic offenders which upgraded and improved the rehabilitation curriculum.

The mentoring provided an effective platform for further study of the area of first aid. During the mentoring in 2014, a new project proposal came out. With the help of the mentor and his colleagues from mentoring group, the methodology was elaborated and reviewed. Five conference presentations in 3 countries (Czech Republic, Poland, USA) followed and two articles were written.

Future tasks:

- Closer cooperation with South Moravian Rescue Service;
- Further study of philosophical, psychological and sociological aspects of first aid and its didactic aspects;
- Resuscitation Conference Prague (October 2015, submission deadline 15th of May 2015) – preparation of presentation.

Kateřina Špriřarová

Latent criminality among drivers: background research. This work aims to summarize the related works about latent criminality. Community policing and other than routine police check are ways to reduce latent criminality. What are the other possibilities? During the mentoring sessions, many suggestions were made and discussed. We came up with other programs and projects focusing on this topic all around the world - e.g. in Sweden. Latent violence was discussed as a possible key concept of this topic.

Lenka Šřámková

1. Public attitude to traffic police: An online survey. The aim of this survey was to describe what people think about the work of traffic police and what members of traffic police think that people think. Drivers on the one end and traffic policemen on the other completed a 35-item questionnaire about the work, objectivity and honesty of traffic policemen, including stereotypes about them. During the mentoring, the items were examined and discussed. Later, the results were presented to traffic police directors as a tool to help them to understand the work situation of traffic policemen and its difficulties.

2. Psychology of enforcement: Possibilities of psychological work with traffic policemen were discussed. Five qualitative interviews with traffic policemen (about their motivation, job satisfaction and suggestions) were conducted in order to understand their work better. The psychology of repression was discussed from a pedagogical point of view (learning theory,

conditioning), and from a social and developmental psychology perspective. The discussed topics included questions concerning the effectiveness of punishment.

3. The “DRIVE study”: An online survey based on the Australian DRIVE study was developed. Its parts focused on risky driving behaviour, risk perception, mental health, alcohol and drug use and driver training.

4. Participation in the translation of the Driver Behaviour Questionnaire into Czech language. This task included discussions concerning modifications in order to adapt the questionnaire for the Czech population.

Matúš Šucha

1. Field study: On site Observation of Driver’s and Pedestrian’s Interaction at Zebra Crossings in Urban Settings. The aim of this work was to describe pedestrian-driver communication and strategies at marked non-signalised crossings in urban areas. The aim was to understand strategies that pedestrians and drivers use in order to maximize their benefits (whether this means to save time, to feel safe or anything else). Implications of this work are in identification of risky factors in drivers’ and pedestrians’ behaviour. Studying these processes should help to better understand pedestrians’ needs and demands with respect to the design of infrastructure.

2. Questionnaire study: How important is traffic safety to you? Within this study, we asked, using Google questionnaire form, 3 questions focused on beliefs and opinions about traffic safety in different countries. These questions were: 1) What does traffic safety mean to you? 2) How much money should be spent to improve traffic safety? 3) How should people change their behaviour in order to improve traffic safety?

Results were presented with respect to different traffic safety cultures and GDP.

3. Theoretical work: Scope of traffic psychology. This paper aims to summarize current state of the art in the field of Traffic psychology.

Petr Zámečník

1. Evaluation of driver improvement courses for traffic offenders: The aim of this work was to describe and evaluate the pilot phase of the implementation of driver improvement courses in the Czech Republic. After knowledge transfer from Austria and Germany concerning driver rehabilitation methods, these programmes were experimentally implemented in city of Brno. Core of this work was to assess the behaviour and attitude change, to verify usefulness of this method for Czech environment and to design a nationwide system of this measure that is expected to lower the recidivism rate considerably.

2. Skid training study: What are the strength and weaknesses? In the frame of this study, a meta-analysis of skid training and safety centres’ efficacy and their contribution for traffic safety was made. From the available data, it became clear that without settling this training

into the context of traffic safety – by relevant education and without respecting inter-individual differences – the participants might fail to grasp the idea of the courses (mostly safe driving in slippery road conditions). Last scientific evaluation in Europe was done in 2003, so there is no evidence about progress and actual efficiency.

3. Hazard perception in traffic offenders: This work was ignited by the need for comparison of self-esteem and real skills in traffic offenders. Short version of picture based HPT was used for the group of traffic offenders who attended driver improvement courses. There were no significant differences between professional drivers and offenders, but both groups were far better than novice drivers. In traffic offenders, the bonus from better hazard perception ability was completely overshadowed by unsafe and risky driving behaviour.

Iva Žížalová

Alcolock in the Czech Republic: The aim of this study was to evaluate attitudes of the Czech population to Alcohol Ignition Interlocks (alcolock) as an instrument for the prevention of driving under the influence of alcohol (DUI). For this purpose an online questionnaire survey was launched. The used questionnaire was designed on the basis of a literature analysis and our pilot phone-survey and it served for the detection of attitude differences that depend on driving experience, drinking experience, DUI experience, road safety knowledge and demographics. Results: The Czech respondents agree with the implementation of alcolock programs in their country, and especially, they would welcome a mandatory use of an alcolock device for DUI offenders as the prevention of recidivism.

Preparation of common project proposals

Four international projects were submitted with intensive contribution from two or three of the partners in the mentoring group – CDV - Centre for Traffic Research, Palacký University in Olomouc, and FACTUM OG Vienna:

Walkation (Horizon2020 – First phase)

The objective of this project should be to study the possibilities of how to increase the share of walking as a transport mode in urban areas by making walking more attractive, and how thereby the congestion could be reduced, and finally to present suggestions of concrete measures how to achieve this. We know that considerable portions of car trips cover only walking distances and also it is well known that there is a very close relationship between walking and public transport. By making walking more attractive, we can reduce car use and increase the use of public transport, which will lead to desired reduction of urban road congestions. Making walking more attractive and better accessible will result in an increase of walking as a transport mode in urban areas, which will lead to *) an increase of sustainability of urban transport (higher demand, financial effectiveness), *) a reduction of air pollution, *) a boost of attractiveness of cities and an increase of citizens' wellbeing (by making the city more liveable) and *) more efficient mobility (accessibility to mobility) for all citizens' groups (especially vulnerable groups of citizens). This main objective of the project should be reached by achieving other objectives:

1. To understand the motivation of people for using (and not using) walking as a transport mode and underlay this with empirical evidence. Main fields which can influence the motivation are walking environment and infrastructure, overlap with other transport modes (first and last kilometre of the trip), cultural background and lifestyle, the feeling of subjective safety, personal well-being, usability (effectiveness, efficiency and satisfaction), length and purpose of trips and possibility of combination with other transport modes.
2. To identify factors which are responsible for the use of certain transport modes with a special focus on the "overuse" of the car and motivation to use public transport.
3. To identify and describe prototypical situations in the public space that are decisive for how people experience walking in practice, thereby considering various citizen groups.
4. To identify and compare attitudes towards walking in different regions and cities across Europe and describe trends with respect to various age- and socio-economical groups; and to describe the role of culture and lifestyle as far as motivation for walking is concerned.
5. To identify the needs of walkers, having two main groups in mind: those who have to rely on walking as the only possible transport mode and those who have an option; and to estimate the proportion of people who can be convinced to switch to walking under certain circumstances.

6. To identify good practices in walking policies and services with respect to the specific needs of various user groups and various conditions (city centre, sub- and peri-urban areas) and their connections to public transport.

7. To deliver evidence-based information for relevant professionals and decision makers in the areas of transport and mobility, but also concerning health, economy and environmental issues, in order to support the development of sustainable urban transport policies and services with respect to limited public budgets and tailored to the needs of different groups of pedestrians, with respect to the main objective – reducing urban road congestions; and production of recommendations, tools and guidance material.

8. To describe to which extent walking can be an effective, safe and satisfying transport mode in Europe, and not only in urban centres, so that it has the potential to replace so many car trips that a considerable contribution to the reduction of congestion would result.

9. To assess the potential effectiveness of a range of measures in the context of a number of pilot cities; this should be accomplished by pilot studies (using suggested measures) and awareness raising activities in 5 to 10 EU cities.

The project was rejected with the argument that the cooperation of the pilot-cities was not assured, which was considered as a major risk factor for the project.

Trust (MOVE/C4)

Demographic change and the associated structural diversification of European population have strong implications for quality of life in general and specifically for the existing transport systems. While these changes do not only affect the growing parts of the older population, impacts regarding safety and general mobility have proven to be more severe for the older age groups in comparison to the younger age groups for a wide variety of factors. There is already safety related data available outlining mostly macro-scenarios of accidents in traffic, and there is a longstanding urgent need for the identification of causal factors and safety relevant risks. Recent research projects have already pointed out the high level of heterogeneity among older road users, not only in regard to their mobility behaviour but also to specific risk factors. When discussing older road users' accident risk factors, actual safety relevant scenarios need to specify factors such as frailty and physical precondition as determinants for fatality risks. In addition, specific types of accidents such as single pedestrian accidents and falls in public transport vehicles are often not considered when assessing traffic safety of older road users. This is to some extent due to the fact that these incidents are often not considered to be accidents as no other road users are being directly involved. To overcome these gaps, a structured approach which pays close attention to the heterogeneity of the older age groups as well as regional differences is needed so that the current situation of older road users in European traffic systems can be targeted. Moreover, factors influencing mobility patterns of older road users are essential when considering traffic safety, as these factors are usually associated with modal shifts towards non

motorized transport options that typically change exposure and accident risks. A number of countries discuss the introduction of mandatory age based fitness-to-drive screenings, or have these already in place, despite evidence from literature suggesting that these measures have no positive effects and often have adverse effects in terms of older road users' safety, mobility, and health. Such developments need to be taken into account when establishing a roadmap of measures that focus on increasing the safe mobility of older road users. The TRUST project aimed at producing a comprehensive and well structured inventory of available results from both scientific research and policy in the fields of older road users' safety outlining the state of the art with regards to identified issues, risk factors and critical scenarios as well as solutions which should be tailored for traffic systems in Europe. Measures introduced by the TRUST project should not only cover the latest and upcoming solutions from the fields of ITS, but also policy schemes and social marketing strategies that aim at sustainable improvement of traffic safety of older road users. The outcome of the TRUST project should cover an assessment of the main trends and analysis of risks for older persons in road traffic taking both regional differences and the overall European reality into account. Hence the focus lies on all older road users, car drivers, bicyclists, public transport users and pedestrians, in order to cover collateral aspects of older road users' safety as well. Existing and expected measures and solutions that attempt to increase traffic safety for older people should be presented to all relevant stakeholders. Technological innovations in the transport sector, especially in the area of intelligent transport systems, and their potential benefits for the safety of older road users should be of specific interest. Finally, recommendations for measures to be taken at EU-level should be provided (including cost-benefit analysis).

The project was rejected, the main reason being that the consortium was too big and thus the project too expensive.

Incubare (FWF-GACR Bilateral co-operation)

The aim of this project is to tackle the issue of young drivers and traffic safety by focusing on the lifestyle and cultural aspects. The driving period between obtaining the driving license (<18) and 25 years is the most dangerous and problematic for all drivers, but especially for young men. During this period, the occurrence of car crash and deadly crash is much higher than in other periods of drivers' careers. The most dangerous types of behaviour are speeding and alcohol, and to some extent the drug use. The reasons for this are:

- the uncompleted brain maturation (e.g. impulse control is not fully developed before 25),
- lifestyle (driving by night, etc.),
- peer effects before the trip (in the car, driving in groups) etc.

The role of cultural influences has been documented only scarcely. Recent research - mostly done in Scandinavia - related to the licensing procedure suggests that lifestyle and cultural

background of young people are closely connected to their behaviour in traffic. Thus we suppose that the cultural background affects the lifestyle of young people and, consequently, has an impact on strategic thinking, communication with other road users, vehicle control and car handling issues. How the car is seen in society, how representatives of authorities and public institutions discuss car use, how media treat it, but most of all how adults behave as car drivers – this is probably most relevant for the behaviour of young drivers. According to the rules of socialization, we expect that young drivers behave like adults, but cannot sufficiently control their behaviour, yet. However, the shortcomings concerning the effects of the cultural background and its effects on driving a car are more severe. Therefore, we wanted to operationalize the "cultural background" (as it has not been done yet, at least not within the traffic area), to make the derived concepts comparable between different groups of young drivers (e.g. male/female, urban/rural, high income/low income) and countries (Austria/Czech Republic), and discuss them in a manner where links to life style, car use etc. could be made visible. The concepts of "values" and "culture" should be discussed and defined. E.g. in our countries the goal is to support individualism, "energy of youth", performance, fun and consumption, but also responsibility, solidarity etc. Such values are certainly reflected in attitudes and beliefs, e.g. the value of life and health, attitudes towards the environment, property, sense of responsibility, etc. How do young people perceive all these elements and how do they translate them into attitudes and action? New findings would make a tailor-made approach to target groups possible; in areas such as driver education, media, safety and mobility marketing.

The project was rejected because methods and procedures were not specified well enough, although there might be a chance for re-submission.

Young drivers and traffic safety – Czech and Norwegian comparison (EEA Funds)

The main objective of this project is a better understanding of young drivers' behaviour and of the reasons for their longstanding safety problems. The project focuses on cultural reality and life perspectives of young drivers. This includes the examination and a detailed description of different cultural backgrounds (including norms, attitudes and beliefs), economical and historical factors, different traffic safety policies (laws, driver training and education, enforcement measures), and different levels of traffic safety in both countries. Knowledge of this cultural and societal background will be described and analysed with reference to the fifth level of GDE matrix (Goals of Driver Education), which is a commonly applied theoretical framework for driver education, training and rehabilitation. Analysis of cultural and societal aspects of young drivers' behaviour will help decision and policy makers in solving traffic safety issues, thus preventing accidents and injuries and enhancing the quality of life.

Based on previous cooperation in DRUID project, the influence of young drivers by lifestyle and cultural aspects emerged as important issue. Our previous findings concerning young drivers were focused on drug and alcohol use. Young drivers have a greater risk of crash

involvement than older drivers because of the lack of driving experience. Moreover, young drivers are inexperienced not only in driving, but also in drinking and in combining these two activities. The data we have for other drugs use are the same. Among drivers under the influence of drugs, there was a high percentage of young drivers. On the other hand, young drivers have a high potential for rehabilitation. For example, the DRUID study proved high effectiveness of some measures (e.g. license withdrawal) among younger drivers.

These findings showed the importance of a complex approach. In frame of appropriate measures it is useless to know the percentage of young drivers who drive under influence or who are prone to speeding if we cannot understand why and how this happens. Without the knowledge of the lifestyle, motives, attitudes, etc. we cannot develop effective tools for enhancing traffic safety of young drivers. The complex view on young drivers concerning cultural background, stakeholders, parents and of course youngsters will allow us to develop specific new measures and also to innovate the existing ones. The results of this complex analysis will be communicated back to the relevant authorities in both countries.

Despite the fact that the projects were not accepted, the submission of four international projects by itself can be considered as quite successful and the networking effect of the submission work was considerable. Two of the projects can be re-submitted.

Preparation and submission of articles

List of papers that were presented in conference proceedings and publications, all of them under the initiative of Matus Šucha, are listed below:

Šucha, M. (2014). *On-site observation of driver's and pedestrian's interaction at zebra crossings*, Presentation at the ICTCT Workshop (International Co-operation on Theories and Concepts in Traffic safety), Karlsruhe 16.10.2014 - 17.10.2014.

Šucha, M., Šrámková, L. & Risser, R. (2014). The Manchester Driver Behaviour Questionnaire: self-reports of aberrant behaviour among Czech drivers. *European Transport Research Review*, 2014, pp. 493-502.

Šucha, M. (2014). What Does It Mean to Be a Driver and What Does It Mean to Own a Car? *International Journal of Traffic and Transportation Engineering*, 2014, pp. 216-221.

Šucha, M. (2014). *Pedestrians and drivers: their encounters at zebra crossings*. In Proceedings of the 8th Fit-to-drive International Traffic Expert Congress Warsaw 2014. Bonn: Kirschbaum Verlag, pp 33-37

Šucha, M. (2014). *Road users' strategies and communication: driver-pedestrian interaction*, Presentation at the Transport Research arena, Paris 14.04.2014 - 17.04.2014

Other papers are under way and will be submitted in the course of 2016. But even if other papers and proposals will be published only after the end of the mentoring, it can be said that the joint work in the group has provided important impulses and suggestions.

Presentation of selected topics by the mentor (~1 hour at every session)

Presentations prepared by the mentor and presented in the frame of the mentoring sessions, each followed by discussions:

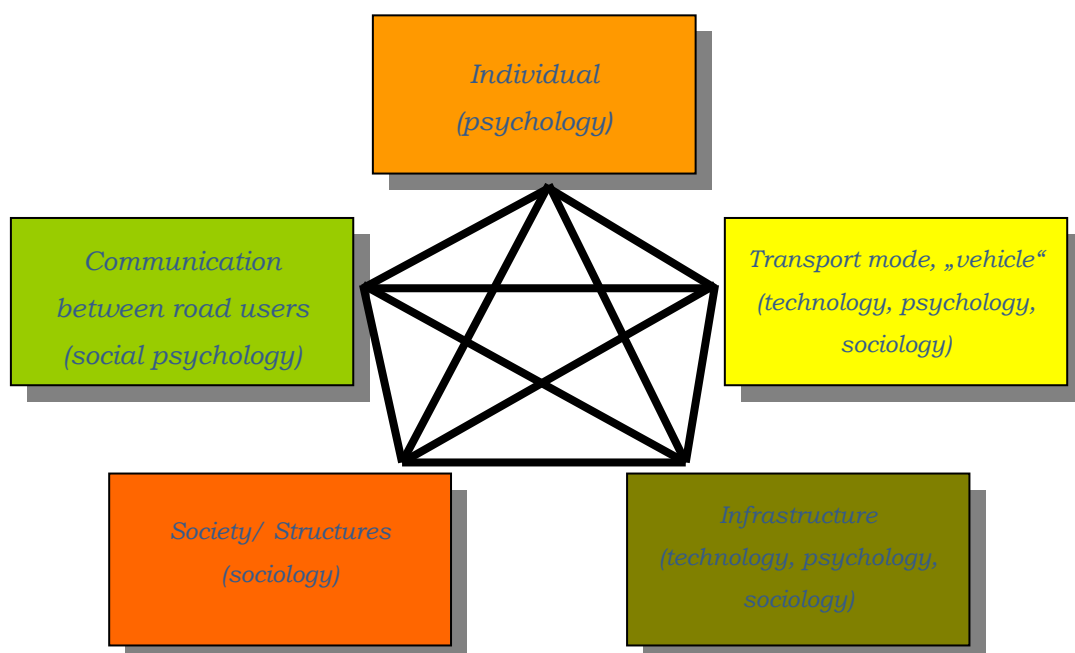
- On-road assessment of drivers
- Quality of life
- Sustainability
- Marketing
- Road safety
- Speed is the key
- Communication
- Effects of measures
- Mixed-methods approach
- Campaigns
- Goals of traffic psychology
- From goals to practice – what does it mean to succeed? (2 presentations)
- Walking as a transport mode
- Cost benefit analyses
- Bus drivers, professional drivers
- Mode choice
- Older drivers
- Traffic conflicts and use in practical work (2 presentations)
- Barriers to implementation – why good solutions are not implemented

The presentations have been collected in a dropbox-file and will be available on the website for all partners – FACTUM, CDV and Palacký University.

The scope of traffic psychology

After two years, the group decided to try to define what the scope of traffic psychology could – or should – be. The discussion followed the diamond model (fig. 1); this model implies that our behaviour as road users is not only steered by our own attitudes, personalities, motives or other individual traits. Strong influence comes from "outside" our individual characteristics, namely from the interaction with other people in the public space, from culture and societal preconditions, from infrastructure features and from the preconditions provided by the chosen - or available – mobility mode.

Figure 1: The diamond model



Individual

What lies behind behaviour

The behaviour of individual in the traffic is a very complex phenomenon, which is influenced by a great variety of factors, including factors connected to the individual (personality, emotions, habits, socio-demography, etc.) and factors related to the situation (situational factors – micro and macro context). Individual behaviour (which can be observed) is then the mixture of these inputs. In this part we will discuss factors linked to the individual and more specifically, factors which lie behind each individual behaviour. To put it in other words, we will focus on factors which shape individual behaviour in traffic.

The relationship between personality, skills, situational factors and behaviour is complex, and it is a challenge for psychology to provide a better understanding of how psychological mechanisms are related to this. Although there are numerous categories of individual differences that can have impact on driving, traffic psychology has often focused on personality variables as they are the most stable ones and can be measured in a valid way. Although there are many definitions of personality, most share the notion that it involves a consistent pattern of thoughts, feelings and actions that emerge with some level of stability across time and context. Traffic psychology has typically relied on this “trait” approach. Certain traits are believed to be inherently more dangerous than others in the traffic environment. Those who possess more of these or in a more dangerous version are believed to be a greater risk to themselves and others. Literature in this field covers (apart from gender and age) mostly the following issues: aggression, risk taking, general problems of adolescence, alcohol consumption, drug abuse, mental disorders, interpersonal violence and criminal behaviour (Deery & Fildes, 1999; Kieling et al., 2011; Lancaster & Ward, 2002; Öz, Özkan & Lajunen, 2010; Vaughn et al., 2011). Furthermore, personality characteristics such as neuroticism, courtesy, sense of duty, impulsiveness, risk-taking, sensation seeking, carelessness, impatience, inadequate self-control and egocentricity have been associated with driving violations and collision risk (Jones et al., 2011; Jovanović et al., 2011; Ross & Antonowicz, 2004).

Many researchers have examined the influence of sensation-seeking (Zuckerman, 1994) and excitement-seeking (Costa & McCrae, 1992) on risky driving behaviour (Jonah, 1997). Costa & McCrae (1992) reported that anxiety was significantly related to negative affect. The driver’s level of negative affect might influence his or her interpretation of the traffic environment and driving behaviour. Garrity & Demick (2001) investigated the relationship between the five-factor personality traits and driving behaviour. They found no significant correlations. However, they reported a significant relationship between the mood state “tension-anxiety”, which is strongly related to neuroticism, and negative driving behaviour. Each of the five traits, neuroticism, extraversion, openness to experience, courtesy and sense of duty, comprises of six more specific traits, or facets. These facets make it possible to identify meaningful individual differences within each trait. Such effects can easily be overlooked if only the main traits are examined (Costa & McCrae, 1992). Other personality traits may also influence driving. Driver’s anger or aggression have been extensively investigated. Deffenbacher et al. (2003) found that high-anger drivers – i.e. those who showed more frequent and intense anger – reported more aggression and risky driving behaviour in daily driving situations.

Normlessness has also been hypothesized to be of importance. In a study by Iversen & Rundmo (2002) respondents who scored high on normlessness were involved in more

risky driving, near accidents and accidents. They accepted more rule violations and cared less than the average whether they broke laws as long as it served a certain goal.

DEVELOPMENTAL APPROACHES

Behaviour in traffic requires a set of complex, interrelated, and simultaneous competencies, including psychomotor, cognitive, and perceptual proficiency. Older individuals often believe that they can drive better than their contemporaries (Levy, Ng, Myers & Marottoli, 2013). Although teens are generally successful at acquiring necessary driving skills, translating these skills into safe driving requires complex strategies, expertise, and concentration. Errors in the execution often result in serious, even fatal, consequences. On the other hand elderly persons are mature enough, but they might experience some cognitive deficits and generally greater physical vulnerability.

To secure safe behaviour of an individual in traffic during the whole lifespan requires an understanding of these multiple and often competing demands of development and environment, suggesting that interventions and policies need to respond to these complex processes.

NEEDS AND QUALITY OF LIFE/WELLBEING

In general, quality of life (QoL) is considered a combination of objective preconditions and perceived quality of the individual's daily life, that is, an assessment of their well-being or the lack thereof. This includes all emotional, social, and physical aspects of the individual's life. QoL is a multidimensional construct (Cummins, 1999; Snoek, 2000; Hagerty, Cummins, Ferriss, Land, Michalos, Peterson, Sharpe, Sirgy & Vogel, 2001) that reflects the personal values of individuals (Snoek, 2000) and/or states whether the needs of the individual in various fields were satisfied or not (Wunsch & Risser, 2002). QoL has three dimensions: 1/ physical: health; 2/ psychological: self-control, self-perceived competence, love, satisfaction, joy, moral, confidence, control over one's life, life expectation, beliefs, desires; 3a/ social (private): social network, support, income, education, job; 3b/ social (public): community, social climate, social security, housing quality, environment, aesthetics of the environment, traffic, crime rate, equality, justice.

With respect to traffic, we focus on following indicators: *) Mobility for all (availability, accessibility, & usability); *) a safe environment (safety), *) a comfortable environment (comfort); *) a secure environment (security); *) a clean environment (cleanliness, no pollution); *) an appealing environment (aesthetics); *) a busy environment (availability of facilities); *) a lively & friendly environment (social aspects); *) public participation in decision making.

QoL is important not only during the trip but for the whole trip from door to door and for mobility in general. One of the relevant traffic psychology issues that have a huge impact on the quality of life is driving related fear. It is estimated that up to 15 % of the population

have symptoms of driving phobia (Taylor & Paki, 2008). A strong phobia of driving (amaxophobia) affects 1 % of the population, mostly young women. Fear is also a problem for the older population (55+), as 25 % of these drivers suffer at least from mild fear (Taylor, 2011). The causes and pathogenesis of the driving phobia are not very clear. Research (e.g. Blanchard, Hickling, Taylor, & Loos, 1995; Blanchard, Hickling, Taylor, Loos, & Gerardi, 1994; Mathew, Weinman, Semchuk, & Levin, 1982; Munjack, 1984; Taylor & Deane, 2000) so far considered driving phobia as a disorder following motor or non-motor vehicle accidents. Even some recent research shows that 18-77 % of people after a serious accident suffer from a phobia (Taylor & Paki, 2008). But this does not imply that driving phobia is always a result of a traumatic experience on the road. It can have various causes as well as levels of severity and symptom patterns (Taylor, Deane & Podd, 2014). Some diagnoses as panic disorder, posttraumatic stress disorder and social phobia are considered to be part of the driving phobia (Lewis & Walshe, 2005). Driving fear frequently appears as an accompanying symptom of agoraphobia.

QoL is also important aspect in professional driving (Wong, Fung, Siu, Wong, Lee, Lo, & Lam, 2012). Results of their study tell that professional drivers reported poorer physical and mental health-related quality of life than the general population.

Behaviour of different types of road users and risky behaviour of car drivers

The definition of a road user according to the Collins Dictionary (2013) is “anyone who uses a road, such as a pedestrian, cyclist or motorist”. There are various types of motorized (motorcycles, cars, trucks, public transport vehicles etc.) and non-motorized road users (pedestrians, bicyclists, cycle-rickshaws, animal carts, and handcarts). The latter are often labelled vulnerable road users (VRUs), the problem with this concept being that also motor cyclists and moped are included, but differ strongly from pedestrians and cyclists with respect to speed, power, and potential to do harm to others. Based on the criteria defined by the AVV (Dutch Transport Research Centre 2003) vulnerable road users are road users with a lower amount of protection around them (pedestrians, cyclists, moped or light moped drivers, motorcyclists) or with a lower task capability (seniors, children or disabled people) or lower resilience. Except for motorcyclists or moped riders, they are not a threat for others, but other road users are a threat to them. They usually do not have a strong protective shell; they have a lower mass and therefore have to face more serious consequences from any kind of accident. VRUs have, unsurprisingly, a high casualty rate. According to WHO data, up to 46 % of all of the road accident deaths are VRUs. A subdivision based on task capability distinguishes road user groups who have limitations in performing one or more task aspects. Disabled road users and road users who are less skilful because of social or cultural circumstances are therefore also considered to be vulnerable road users. A strict application of these criteria would also label novice drivers (limited task capability) or elderly car drivers (low resilience) as vulnerable. There is a supplementary criterion, though, applied to novice and older car drivers (which strangely enough is not applied to motorcycle and moped

riders). The vulnerable road users should not be a threat to others. For this reason neither young nor elderly car drivers are considered to be vulnerable: their vehicles can be a threat to others. There is of course also a difference in speed compared with pedestrians and cyclists. There are many ways how better safety for VRUs can be achieved: *) adaptation of motor vehicles (side-under-run-protection for trucks, good side and rear view devices to minimize the blind spot when turning right, “pedestrian-friendliness” of car-fronts, including front airbags etc.); *) adaptation of the infrastructure (layout and maintenance of the pavements and bicycle paths to avoid accidents where only VRUs are included), *) speed limits (lower collision speeds in case of a crash) based on the principle of speed homogeneity of different road user groups at places where they have to interact.

Mostly, driver behaviour has been in the focus of studies so far. Rothengatter (1997) pointed out that research in traffic psychology shows not only the importance of performance factors, but also the importance of motivational and attitudinal factors. One of the models that explains driver’s behaviour is the GADGET model (Hatakka, 1998), a four-level descriptive model in which driver behaviour is conceptualised as a hierarchy, in which the goals and motives of the driver play an essential role. An analysis of the driver’s task and accidents has shown that adequate psychomotor skills and physiological functions are not sufficient for good and safe performance as a driver. This conclusion is in line with the notion that driving is a self-paced task (Näätänen & Summala, 1974) where the driver himself can see to the provision of safe preconditions for driving – IF he is motivated to do so, if he understands correctly what safe preconditions are. Safe driving behaviour is defined as behaviour which has no potential (or little potential) to cause harm to the driver himself or to others, which is in line with expectations of others and which follows formal rules and cultural norms. Risky driving behaviour is any behaviour linked with a significantly higher likelihood of being involved in a crash. High-risk driving behaviour types are numerous and often interrelated. However, it appears that four driving behaviours types are universally depicted as major risks: 1) speeding; 2) driving under the influence of alcohol and drugs; 3) non-use of a safety belt and child restraint, and 4) running red lights or stop signs. Others which are frequently reported are: *) driver distraction and inattention; *) driver fatigue; *) aggressive driving; *) driver stress, anxiety, and anger, and *) work-related road risk.

RISK PERCEPTION

Most people believe that their own probability of encountering negative events in the future is lower than that of other people’s (Castanier, 2012). This belief has been labelled unrealistic optimism (Weinstein, 1980). The optimistic evaluation is not necessarily unrealistic and the objective risk for a single individual can hardly be estimated, but still there is comparative optimism (Harris & Middleton, 1994). People may also express comparative pessimism, assessing their own risks as higher than those of others (Causse et al., 2005; Meyer & Delhomme, 2000). Numerous studies have shown that drivers and motorcyclists tend to express comparative optimism (Delhomme et al., 2009; Harré et al.,

2005; Rutter et al., 1998; Svenson, 1981), believing that they have above-average abilities and reflexes (Delhomme, 1991; Harré et al., 2005; Horswill et al., 2004).

Trivially, risky drivers are all drivers that behave risky. Based on the AVV definition (2003) risk drivers are a threat to other road users but not mainly or not necessary to themselves, in contrast to vulnerable road users. There are various methods how the risky driving can be measured, e.g. the Driver Risk Index™, the RoSPA Driver Profiler, the Violation Willingness Scale (VWS), Attitudes to Driving Violations Scale (ADVS) (West & Hall, 1997). There is a growing body of literature showing that there is considerable overlap between high risk driving behaviours (e.g. Smart & Vassallo, 2005). The "driving after drinking – seat belt non use" link is well established. For instance, roadside surveys have shown that seat belt non users were twice as likely to have been legally impaired. Indeed, the profile of fatally injured drivers who did not use their seat belt is – to a large extent – similar to those who died after drinking: weekend, night-time, male, etc. Other overlaps have been observed between speeding and running red lights, running red lights and seat belt non use, etc. The exact magnitude of high risk behaviours overlapping is not known. It cannot be assumed that they are committed by the very same individuals, but overlapping appears clearly prevalent.

SPEEDING - SPEED IS A CENTRAL ISSUE IN ROAD SAFETY

Related to road safety, speed affects 1) the risk of being involved in an accident, and 2) the severity of an accident. In general: the higher the speed, the higher the accident risk and the more severe the accident consequences. In fact, speed is involved in all accidents: no speed, no accidents. Speed has been found to be a major contributory factor in around 10 % of all accidents and in around 30 % of the fatal accidents (SafetyNet, 2009). Both excess speed (exceeding the posted speed limit) and inappropriate speed (faster than the prevailing conditions allow) are important accident causation factors. In addition, speed generally has a negative effect on the environment, but a positive effect on travel time. The negative effects are mainly a societal problem and are hardly noticed by individual drivers; individual drivers, on the other hand, particularly notice the positive effects. Based on work by Nilsson (1982) in Sweden, a change in average speed of 1 km/h will result in a change in accident numbers ranging between 2 % for a 120 km/h road and 4 % for a 50 km/h road. Despite the fact that the vast majority of drivers exceed the speed limits, excessive speeding (> 20 km/h above the limit) is concentrated among around 15 % of the driving population. The relationship between speed and accident risk is a power function: With increasing speed, the accident risk increases more as the absolute speed is higher.

DRIVING UNDER THE INFLUENCE OF ALCOHOL AND DRUGS

About 25 % of all road fatalities in Europe are alcohol related whereas about only 1 % of all kilometres driven in Europe are driven by drivers with 0.5 g/l alcohol in their blood or more (ERSO, 2009). As the Blood Alcohol Concentration (BAC) in the driver increases, the crash rate also rises. The increase in crash rate that goes with increasing BAC is progressive.

Compared to a sober driver the crash rate of a driver with a BAC of 0.8 g/l (still the legal limit in 3 of 25 EU-member states) is 2.7 times that of sober drivers. When a driver has a BAC of 1.5 g/l his crash rate is 22 times that of a sober driver. Not only the crash rate grows rapidly with increasing BAC, the crash also becomes more severe. With a BAC of 1.5 g/l, the crash rate for fatal crashes is about 200 times that of sober drivers (ERSO, 2009). On any given night, it is estimated that one driver out of ten had been drinking and between 2 % and 3 % are over the legal limit. More recent research has drawn the attention of governmental bodies to higher BAC; roughly 2/3 of drivers who have been drinking and involved in a fatal or serious crash have a BAC of 160 mg% or more. Before being caught by police, approximately 200 drives under influence of alcohol are driven by drivers who drink before driving. Some authors (Kloeden et al., 1997) have noted that the increased risk from driving at speeds 10-20 % above the average for the road is similar to the increased risk from driving at the drink drive limits in the two countries to which the references relate (i.e. a BAC of 0.05 and 0.08). This is based on empirical research in Australia. Alcohol is associated with 40 % of fatalities and 20 % of serious injuries occurring on the road. Around 25 % of drivers have admitted to driving after drinking, at least occasionally (TIRF, 1997).

NON-USE OF SAFETY BELT AND CHILD RESTRAINT

Approximately 90 % of the driving population wears a seat belt. However, this 10 % of non-use is associated with an astonishing 40% of fatalities (Gutoskie, 1999). Although non-use of seat belts does not increase the crash risk per se, there is abundant evidence that this behaviour is related to other risky behaviours. Combined with seat belt effectiveness in preventing fatalities in the occurrence of a crash, this former fact explains the substantial overrepresentation of seat belt non-users among fatally injured drivers (Canadian Council of Motor Transport Administrators, 2001).

RUNNING RED LIGHTS OR STOP SIGNS

According to a recent survey of jurisdictions, around 7 % of fatalities and 8 % of serious injuries take place at controlled intersections. Although it varies a lot by intersections, the prevalence of running red lights or stop signs is estimated to be around 1 % which – given the large volume in traffic – represents a substantial problem. Also, red light and stop violations represent approximately 18 % of all traffic violations reported by police (Canadian Council of Motor Transport Administrators, 2001).

DRIVERS' DISTRACTION AND INATTENTION

Driver Inattention means insufficient or no attention to activities critical for safe driving, and that Driver Diverted Attention (which is synonymous with “driver distraction”) is just one form of driver inattention. The other forms of driver inattention are labelled tentatively as Driver Restricted Attention, Driver Misprioritised Attention, Driver Neglected Attention and Driver Cursory Attention (Regan et al., 2011). There is increasing evidence that driver distraction and driver inattention are major contributing factors in car and truck crashes and

incidents (e.g. Klauer et al., 2006; Olson et al., 2009), and it is likely that the problem will increase as more technologies find their way into vehicles. Evidence suggests that driver distraction and inattention are even more dangerous as contributing factors in crashes than drug and alcohol intoxication.

DRIVERS' FATIGUE

Survey research world-wide suggests that over half of all private drivers drive while being fatigued or drowsy at least once a year. Fatigue is a major factor in a large proportion of road crashes (range 10-20 %). Several studies suggest that fatigue is associated with increased crash risk (ERSO, 2013). A person who drives after being awake for 17 hours has a risk of crashing equivalent to being at the 0.05 blood alcohol level (i.e. twice the normal risk) (ERSO, 2013). Amongst young drivers, driving while fatigued is quite common due to lifestyle factors. Adolescents need more sleep than adults; fatigue may affect youngsters more than adults. Most professional drivers and shift workers have to cope with fatigued driving on a frequent basis due to work-related factors. About half of professional drivers take less than normal sleep time before a long-distance trip. The concepts of "fatigue", "sleepiness" and "drowsiness" are often used interchangeably. The most general factors that cause fatigue are lack of sleep, bad quality sleep and sleep demands induced by the internal body clock. Besides these general factors, prolonged driving (time-on-task) can increase driver fatigue, especially when drivers do not take sufficient breaks.

AGGRESSIVE DRIVING

The U.S. National Highway Traffic Safety Administration (NHTSA, 2013) defines aggressive driving as a progression of unlawful driving actions such as

- Speeding – exceeding the posted limit or driving too fast for given conditions;
- Excessive lane changing – changing lanes without reasonable cause;
- Improper passing, disregarding signs, using an emergency lane to pass or passing on the shoulder;
- Cutting into another car's path;
- Tailgating – driving near the back of another's car at too close of a range.

DRIVER'S STRESS, ANXIETY AND ANGER

Whereas emotions such as anxiety, depression and stress are widely acknowledged as having a detrimental effect on cognitive performance, the cognitive and behavioural effects of driving anger have received relatively little attention (Gulian et al., 1989; Matthews & Desmond, 1995). Deffenbacher et al. (1994) postulate that anger experienced while driving might affect safety in various ways. Referring to the large body of literature devoted to the emotion-cognitive performance relationship, Deffenbacher et al. (1994) postulate that anger: "might influence motivation to commit various risky driving behaviours that in turn

may increase accident liability during the emotional episode". For instance, anger experienced while driving might predispose an individual to engage in dangerous driving behaviours such as tailgating, speeding or flashing their lights.

WORK-RELATED ROAD RISK

Work-related motor vehicle road crashes occur at the workplace and in driving associated with work (excluding commuting). Most work-related crashes involve company cars. In the United States, Australia and the European Union, work-related crashes contribute about one quarter to over one third of all work-related deaths. Improving work-related road safety and fleet management would much improve road safety as a whole.

Assessment of Fitness to drive

Driving motor vehicle is associated with increased functional independence and is an activity that became a vital and integral part of life of western societies. Following neurological injury, questions often arise regarding potential risks to self and others and whether the patient is (still) fit to drive. Although for most experienced drivers the task of driving involves many over-learned and automated behaviours, driving is not completely a routine activity since many cognitive functions are needed to respond effectively and appropriately to continual changes in environments and to the incessant influx of complex information. Contemporary models of driving include perceptual-motor skills as well as general and higher-order cognitive functions (Bliokas, 2011). Caution is warranted in using any one office-based tool to predict fitness to drive; rather, a multi-factorial assessment approach that includes physical, cognitive, and visual-perceptual components, is recommended (Vrkljan, 2011).

Driving own car is for many people one important aspect of daily life, and could be a determining factor for the achievement or up-keeping of autonomy and life satisfaction. Despite the fact that there is no generally applicable ultimate driver behaviour model, most actors in the field would agree on the fact that certain skills are required, such as motor skills, perceptual skills, and cognitive skills. Changes in these skills are inherently concomitant of the ageing process. With the absolute and relative ageing of Western societies fitness-to-drive assessment of elderly drivers is thus becoming an increasingly important multidisciplinary topic for occupational therapists, driver behaviour researchers and related professions. The maximum performance capacity in most sensory, physical, and cognitive domains decreases in later phases of life. The reduction in optimal performance is accompanied by an increase in inter-individual variability of performance at the population level. Owing to this scatter around the age cohort's mean value, the chronological age is only a vague predictor for the actual capabilities of a specific older person. Even if an older person shows reductions in optimal performance the person might be able to compensate for a given deficit (Sommer, 2004). In order to drive safely, attention, concentration and

memory should be unimpaired. More importantly, because over 95% of the sensory input into driving is visual, visuo-spatial functioning must be intact.

However, in order to be safe, drivers should, among other capacities, have good control over impulses and risk-taking behaviour, be mature in judgment and have the ability to anticipate the actions of other road users along with having problem solving and hazard perception skills. Human errors associated with accidents include cognitive dysfunctions, perceptual problems, and misinterpretation of the actions of other road users, looking but not seeing, inattention, and distraction. Very often, speed is associated with accidents. Judgment of speed can be impaired by a number of factors; alcohol and drug abuse are prime examples. A comprehensive assessment needs to be tested to ascertain fitness to drive.

The outcome should depend on the mental state examination and on the assessment of the perceptual and motor skills required for driving. Higher standards are required for vocational drivers who spend longer time in vehicles, drive heavier vehicles or carry many passengers. Accidents involving such vehicles could endanger many lives. All findings should be reviewed after a designated time (Kumar & Pickering, 2001).

The most consistently used cognitive-perceptual tests for assessing cognitive fitness to drive are the Trail Making Tests, the Motor-Free Visual Perception Test-Revised, and short cognitive screening tests. There are also researchers who argue that a client's behind-the-wheel performance should be the main factor in making a fitness-to-drive recommendation (Fastenmeier et al., 2014, in preparation). Few specialists are using computer-based tests or interactive driving simulators (Dickerson, 2013).

The laws governing the licensure of drivers vary from state to state, as do the methods for revoking a license due to decreased competency to drive. Some states require physicians to report drivers who they believe are no longer safe or competent; other states provide no anonymity or immunity from liability to physicians whose patients lose their license after being reported. At the very least physicians face the ethical issue of confidentiality versus the responsibility to protect the public from potential harm. No clinical test will definitively determine the competency of an individual to safely operate a motor vehicle under all conditions with a high degree of statistical certainty. Due to the complexity of driving, and the ever-changing environment, even on-the-road testing can provide a picture only of how well an individual performs the driving skill on that particular day, in that particular setting (Baker, 2007). Driving is an important activity of daily life. Loss of driving privileges can lead to depression, decreased access to medical care, and increased healthcare costs. The ability to drive is often affected after stroke. In approximately 30 % of stroke survivors, it is clear from the onset that driving will no longer be possible. Approximately 33% of survivors will be able to return to driving with little or no retraining, and 35 % will require driving-related rehabilitation before they can resume safe driving again. The ability to drive is not routinely evaluated after stroke, and there is no established rehabilitation program for post-stroke driving. When driving evaluation does occur, it is not always clear which tests are the most

salient for accurately assessing post stroke driving ability (Akinwuntan, Wachtel & Rosen, 2012).

Training and education

Today, driving schools are using tools such as computer-based training, driving simulators and onboard video monitors in their driver education programs in an effort to deliver more and better training and performance feedback. According to Leavitt (2006) the results are encouraging. Most types of education are considered successful if students meet the learning objectives and pass tests. But driver education is expected to change subsequent behaviour sufficiently in order to produce measurable effects on accident outcome. Driver education has strong face validity among program providers and parents, who think it produces safer drivers. However, based on a long history of evaluation research, most researchers are sceptical about the safety benefits of driver education. Driver education is intended to mitigate novice driver risk factors. But the recognition is growing that safer driving involves changing the choices and habits that determine actual driving behaviour – i.e. the life style. Individual, social, and cultural factors are important but not yet well addressed. Inadvertent errors and unsafe choices probably both contribute to young novice drivers' excess risk, albeit perhaps not in the same proportions for all crashes and at all times (Lawrence & Lonerio, 2008).

Rehabilitation of drivers – driver improvement

According to accident data, driving a motorised vehicle in traffic does not only require skills for manoeuvring but also social responsibility. Traffic violators primarily do not lack skills but positive attitudes towards social responsibility. Especially drunk drivers and speed offenders are characterised as not reliable in traffic. Consequently, their licence is withdrawn. Obviously, punishment and withdrawal of the driving licence alone are not sufficient to prevent those drivers from repeated offences. In order to improve drivers' reliability, rehabilitation programmes have been developed in many EU-countries. Those programmes are measures that aim at a change of the behaviour of traffic offenders, in order to prevent further offences and to help them to keep or to regain their driving licence. During the last three decades, driver rehabilitation programmes for traffic violators have become a more established measure aiming at the reintegration of offenders, i.e. of high risk drivers in the traffic system again (Bartl, 2000). Driver rehabilitation courses are recommended for novice traffic offenders but also for experienced drivers who have infringed certain laws. The programmes are generally targeted for offenders with attitudinal deficits. Referring to the hierarchical model of driver behaviour (Hatakka, 1996) driver rehabilitation programmes are focusing on drivers' deficits in the two highest levels of the so-called Gadget model (level 4: personal attitudes and level 3: trip related issues and influence), according to the understanding that it is not the two more skill-related basic levels (2: mastery of traffic situations and 1: vehicle manoeuvring) that cause the problems of repeated infringements. On level 4, it is the goal to change personal attitudes and cognitive beliefs concerning drunk driving and risky driving

that are connected to misbehaviour. On level 3, erroneous planning of trips is the important topic; situations that enhance drunk driving or a planning that necessitates speeding should be avoided, among other things. Due to deficits in the levels 3 and 4, these offenders are categorised as not being reliable for driving a motor vehicle, and the rehabilitation courses have the goal to re-install reliability.

Travel mode choice

Lack of physical activity presents a serious challenge in modern societies. The crucial point of this application is the fact that in the course of daily routine considerable parts of the daily recommended physical activity (by WHO) could be achieved by walking, bicycling or use of public transport without any additional effort. Fitness and health benefits from the use of these modes are considerable, but there seems to be a lack of understanding of this fact on the side of road users. Psychology could – and should – contribute to produce convincing information about fitness benefits of different modes, thereby considering attitudes and existing barriers in comparison to increased physical activity. Existing habitual use of the car should be replaced by a more rational behaviour that allows to choose other modes at occasions where this is reasonable. To this end it is also necessary to make preconditions for the use of these modes more appealing. To achieve this it is necessary to understand road users' motives, wishes and interests. It is widely recognised that attempts to address unsustainable patterns of travel involve a detailed understanding of travel behaviour and the reasons for choosing one mode of transport over another. Increasingly, psychological factors, including lifestyle, perception, identity, social norms and habits, are being used to understand the choice of the mode of travel (Forward, 1994). Traffic psychologists focus on analyses of the motives, attitudes, problem awareness, norms, and beliefs of road users, in respect to better understand individual transport mode choices and to identify possibilities of shift towards more sustainable modes of transport. According to the state of the art such a shift is possible if it affects life quality positively. But what is life quality? According to what can be found in recent literature, and also according to common sense, life quality depends on how people assess their own living conditions, and sometimes subjective well being is used as a synonym for life quality (see Risser et al., 2003). It is a concept that contains very many subjective elements. A study by Hakamies-Blomqvist & Jutila (1996) gave the following result: When people assess their living conditions in relation to traffic preconditions ("the set scene") they consider, among others, the social values (contacts, relationships, transactions), health aspects, the provided comfort ("easy to use"), weather protection (against rain, sun, snow, wind), safety preconditions (reflecting most of all the feelings of safety), mobility (meaning the given possibilities to be mobile spontaneously), and aesthetics.

*) Social Values: One problem, consciously or unconsciously experienced by non-motorised road users and residents, is the low status of those traffic modes, especially compared with driving a car. In contrast, the car symbolises such concepts as power, prestige, independence, freedom and status, and infrastructure assigns value in a certain sense: For

instance, traffic calming gives officially more weight to walking and cycling. Furthermore, the nature of the interaction between different road users influences the feelings of self-assuredness. Traffic calming produces fairer preconditions for interaction. Also, the feeling of safety is largely affected by the nature of this interaction.

*) Health: Walking and cycling are good for health. Thus, infrastructure that supports walking and cycling would have certain health effects. Good health is usually also connected to the degree of one's subjective well-being.

*) Comfort: The public road space is not only used for transport, but also for socialising, spending time and relaxing. Special facilities for the comfort of the people using road space in this manner are benches, waste-baskets, finger-posts, shelters and public toilets, cafés, kiosks and restaurants, etc. The motor activities of non-motorised road users in a stricter sense are greatly affected by pavement conditions. Negative experiences are mostly caused by dirt or obstacles on the pavements, and they should be avoided. Feelings of insecurity are related to bad surface conditions (holes, broken surfaces, litter and glass) and very narrow pavements. If such preconditions are controlled to a certain degree, infrastructure can contribute to comfort.

*) Weather: Weather conditions affect people outside cars. If shade and shelter from rain are provided, which in many situations is quite easily done (e.g., roofed stop shelters of public transport, roofs in front of shops, etc.) a lot of "weather problems" can be solved – which could easily be an improvement compared to the "non-calmed" situation today.

*) Safety: Experienced safety does not always correlate with objective safety. To increase the experienced safety of cyclists, they should be separated from cars. The experience of safety of the pedestrians is threatened by both cars and by cyclists, especially that of the elderly pedestrians. Personal security can be threatened especially if the illumination is not sufficient. This is a problem especially for women. If infrastructure measures consider the needs of non-motorised road users and of residents who want to feel assured that their children are safe when they use the calmed areas, this can contribute considerably to subjective well-being.

*) Mobility: There are two aspects of infrastructure that affect mobility most: Space (e.g. lack of parking space will keep people from going to such places by car; or: narrow pavements or lack of a consistent walking network will keep people from walking) and safety/security: senior drivers avoid difficult roads; or: parents do not want to let their children walk alone along "dangerous" roads. Also, stopping at traffic lights is experienced as a significant problem. Traffic lights do not provide a fair distribution of time between motorised and non-motorised road users.

*) Aesthetics: Car drivers and passengers keep their eyes mainly on the road. They tend to notice movements in terms of other traffic, people and animals that could affect their advancing. When they look beyond the road they focus on bigger landmarks such as

buildings. Pedestrians and cyclists, because of the slower pace, have time to look around and take conscious notice of the environment. Especially a green environment is valued. Noise of surrounding traffic and pollution are experienced as both aesthetical and health problem.

Societal issues – social and cultural impacts

Rules and norms in traffic are a result of political power and political decisions. If society, e.g., estimates speeding or the infringement of the right of way of pedestrians by car drivers as a big problem, this will have consequences for the formal and informal traffic rules in a country, and those rules will be adjusted accordingly. Media play an important role, there, because they support special opinions and influence people's view on problems in traffic. For instance, problems with the choice of speed, distance to vehicles in the front or on the side etc., may arise in a similar form as handling problems, namely from individual shortcomings. But the problem of informal norms is quite predominant, as well; how do individuals judge if they drive above the limit together with many other people in a constant state of flux? One could for certain try not to do so, but this can be difficult, or impossible; it could in fact endanger traffic safety. That is to say, the wished-for state in many cases is that all drivers behave in a similar - homogenous - way. In this respect young drivers pose a special problem. They behave more "dynamically/energetically", and one may assume that especially those informal norms that reflect dynamics and energy – like driving above the speed limit – are taken up by this group and even exaggerated (Chaloupka et al. 1997; Chaloupka et al., 2011; Risser 2011). Problems may become especially big when the influence of peers facilitates the approval of informal rules, even when they contradict formal rules and lead to rule breaking (like, e.g., drink driving after the disco). Such cases have certainly not very much to do with lack of abilities, but with motivation to behave otherwise than wished-for. Thus, a lack of routine can be the reason for certain forms of driving as well as the problem of having "never learned anything else". In conclusion, social conditions often urge specific behaviour which contradicts respecting rules: Working times and loading orders of professional drivers, youth characteristics and peer pressure for young drivers, etc. As said, what is considered a problem is "defined" in a complex way in society, and formal rules (laws) and informal rules may differ. If, however, the public agrees on problems (if these problems become an "issue" as Vasconcellos, 2000, puts it), then aberrant behaviour will vanish step by step and wished-for behaviour will prevail.

Individual behaviour as an outcome of socialisation and socio-cultural preconditions

Individual behaviour in traffic is a socialisation process and is influenced by cultural processes. The traffic environment provides a social context with very distinct rules and norms that are transmitted between road users across time and generations. For instance, according to Rosenbloom (2009) males cross intersections with red lights more frequently than females. There are also differences in conditions when people cross red lights. Tendency to cross with red lights is greater when there are fewer people waiting at the curb.

Attitudes towards behaviour in traffic are largely learned, which includes influence of parents, peers, media, and other road users. Parents represent one potential source of cultural and normative influence on behaviour in traffic, particularly for young people. Another important source of cultural and normative influence stems from the media, which are prone to promote danger and risk, rather than safety, as a normal part of traffic behaviour.

DRIVING CULTURE DRIVING NORMS AND HOW THEY ARE SHAPED

Perception of risk may influence risk-taking or health protection at individual level, and may be related to the way people perceive safety recommendations (Chappé et al., 2007; Helweg-Larsen & Shepperd, 2001; Rundmo & Iversen 2004; Ulleberg & Rundmo, 2003). So it is the key concept to which traffic psychology and culture psychology researchers relate their investigations. According to Rundmo (2012), in social cognition models, such as the Theory of Reasoned Action and the Theory of Planned Behaviour, it is hypothesised that attitudes, norms, and behavioural intentions predict behaviour (Ajzen & Fishbein, 1980; Ajzen, 1991). Social cognitive health models, such as the Health Belief Model (Rosenstock et al., 1988), also suggest a direct link between risk perception and behaviour (i.e. safer behaviour increase in line with increased risk perception). It is well known, that risk perception and attitudes are related to risk taking, driver behaviour and accident involvement especially in high-income countries (e.g. Deery, 1999; Iversen & Rundmo, 2004; Machin & Sankey, 2008; Rhodes & Pivik, 2011; Ulleberg & Rundmo 2003). But studies from African, Near Eastern and Asian countries have suggested that attitudes and risk perception are not or only weakly related to driver behaviour in these countries (Lund & Rundmo, 2009; Nordfjærn et al., 2011; Nordfjærn, 2014). In the frame of driving culture, “Traffic Safety Culture” (TSC) is a predominant concept and the scientific focus is shifting into this direction (Kissinger, 2012). The behaviours of others or perceived norms can be very local such as in a family or in a place of work, and can be also very broad, such as across a national culture. The perceived norms that influence the willingness to engage in risky behaviours or willingly choose best safety practice can be referred to as safety culture (Atchley, 2014) and it differs for various transport modes (e.g. bicycle safety culture –Nævestad, 2014). Part of the TSC as Ward & Özkan (2014) showed is “cultural resistance” – an inherent level of risk accepted by a certain culture, by accommodating high risk driving behaviours and rejecting traffic safety policies. It was shown, that demographic, political, economic and cultural factors influence the rate and pattern of collisions. However, it is not primarily culture in general which predicts drivers’ behaviour but, as expected, traffic safety culture more specifically (Keohane, 2002). The general problem with relation of culture and traffic behaviour is that there are several cultural theories and their validity strongly differs when it comes to predicting traffic risk perception and driver behaviour. In any case, it seems that cultural factors are more relevant than social-cognitive constructs for traffic safety in low- and middle-income countries as less strict road traffic regulations and/or a tendency to not

enforce such regulations make informal and less rule-oriented psychological processes important for risk decisions. Therefore, culture may have an important role.

PUBLIC POLICY

During past decades certain problems stroke the cities in modern societies. Ecological issues concerning the environmental consequences of the use of motorized transportation, overpopulation in the cities, concerns about the impact of car use on health, problems in terms of cost and time loss due to traffic congestion etc., force public authorities as well as road users to reconsider and change their transportation mode (SafetyNet, 2008). This dynamic is encouraged by public policies, through campaigns in favour of sustainable transportation (Martens, 2004; Pucher et al., 2010; Rietveld & Daniel, 2004). This does not only relate to driving behaviour choices, but also to decisions affecting acceptance and compliance with these traffic safety policies that may govern driving behaviour. This relationship is especially relevant to traffic safety agencies that develop and manage traffic safety policy. For traffic safety programs and policy to be sustainable, it is necessary to consider the culture of the driving population, as well as compatibility among traffic safety agencies that develop those programs and policies (Ward & Özkan, 2014). For better efficiency policy they need to be sensitised to local cultures, and to extend beyond issues related to the engineering of cars or to infrastructure (Wells & Beynon, 2011).

ENFORCEMENT AND DETERRENCE

Deterrence can be divided into primary deterrence aimed at the general public and secondary deterrence aimed at particular individuals (Klitzner & Sole-Brito, 2002). Both groups make different cost-benefit analyses to make decision whether or not to violate rules. Road user may violate the rule because the expected cost is lower than expected reward such as reduced travel time or emotional enjoyment. Enforcement is the strategy to reduce the relative benefits by increasing the saliency of costs (fines) associated with violation of traffic laws (Ward & Özkan, 2014). The difference between the groups is that the potential cost for secondary deterrence group are much higher which leads to adding hidden and catch avoiding strategies to their normal behaviour. There are three main aspect of effective enforcement: 1) subjective probability of being caught, 2) severity of punishment and 3) celerity of punishment. The perceived risk of detection - and not the objective risk - is the main general deterrent factor. In most cases, the first one is higher than the second one, which is mainly influenced by the intensity of the media coverage. Increase of the sanctioning certainty is much more effective than an increase of the sanctioning severity. The punishment celerity is a further important deterrent factor. The certainty of punishment ("high perceived risk of being caught") is relatively more important than the severity of punishment (the size of the fee or length of imprisonment), for various types of offenses/crimes (Decker & Kohfeld, 1990; Gibbs, 1968; Grogger, 1991; Tittle, 1969). Grosvenor et al. (1999) make the same differentiation in an application to drink driving.

Apart from cost benefit analysis our behaviour is shaped by values, beliefs, norms, attitudes and risk perception as well as the sources of influence that are common to most people within an identified group (Ward & Özkan, 2014). And it is culture that provides the collective influence that can provide basis for strategies, campaigns and persuasions to change the unwanted behaviour. In case there is compatibility among traffic safety agencies it is easier to make effective strategies and campaigns as the synergy effect has a considerable potential. Technical guidelines for developing such measures based on psychological theories and empirical researches are well known (e.g. from CAST, 2006) and they can be used not only for direct behaviour changes but also for cultural changes. Successful cultural change is rather stable and sustainable as culture is not subject of short-frequency fluctuations. But firstly we have to understand the TSC (Traffic Safety Culture), before we can apply this transformation process to support appropriate road users behaviours.

Public health

From a public health perspective, road-related deaths and injuries are a world-wide problem. The lives lost and injuries caused by traffic crashes represent a significant public health issue for our society so there are lot of measures to prevent it. The most common ones are based on education, engineering and enforcement. From psychological perspective driver behaviour is the primary factor in traffic crashes. Regarding education there are graduated driver licensing programs, on-road skills training, risk perception trainings and law education. Road users use this information to regulate their behaviour. Other kind of regulation is the physical design of the roadway (speed bumps or arrows) which includes features that minimize crash outcomes (Ward & Özkan, 2014). As for the enforcement, people make their individual cost benefit analysis and based on it they make decisions.

Road users interaction - Communication

Communication between road users is the most important issue (Risser, 2010). Training and appropriate infrastructure design (paving etc.) may improve communication and thus increase safety. Communication between road users must have highest priority when infrastructure is designed because accidents between two or more road users (the vast proportion of accidents in populated areas) must always be understood as a collapse of communication. It is essential to know how to deal with others. On the road, an efficient communication with others is of vital importance because it is happening under physically dangerous conditions. One major problem is, that we do not seem to learn systematically about the effects of our behaviour (especially as car drivers) on other road users (i.e. those in the car's immediate vicinity) in the driving school lessons. Concerning our behaviour as road users, we do not seem to learn to formulate our wishes and needs in a definite but at

the same time respectful way. Thus, we do not know how to support others in a way which contributes to a well working, smooth traffic or to more traffic safety, which is helpful for all road users in the end. Road use is an area where communication is very much reduced between those who sit in motor vehicles and others. The possibility to give and to receive social feed-back – in order to learn about the others - is very much reduced for any person who sits in or on a motor vehicle, due to very short encounters and physical separation. This results in a situation where one has to act accordingly to one's own judgements and interests. Concerning safety, communication is definitely the most important aspect. The estimated percentage of accidents with injuries with two or more participants (therefore a collapse of communication) varies from 60% to 80% (depending on different road users, countries or way of counting). One of the most necessary steps to take for an increasing road safety – but not only – is therefore improved communication. As said, communication is very much restricted in cars and meta-communication is simply not possible. For instance, it is very difficult to communicate to someone that something one did just a second before “was not meant as an offence” while sitting in the car. This is in every respect very problematic because stress and antagonism emerge from this and (especially) traffic safety gets worse (Risser, 1990). Finally, communication forms our behaviour: it is where we learn about "how one behaves on the road", i.e. about how norms are respected and what informal norms are to be followed; we learn this by observing the others, which is a part of communication.

It is not easy to imagine how communication could be influenced actively. Infrastructure measures could help. For instance, speed can be regulated in sensitive situations so that communication which emphasises the own interests, can be prevented; e.g. if someone does not reduce speed in front of a crosswalk, a hump may alert him to do so. Lower car speeds will result from this and communication between, e.g., car drivers and pedestrians will improve. Law enforcement is another possibility, but it will only be effective if traffic controls are made consistently and, if clearly defined communicative behaviour will be sanctioned systematically. Road users have to understand which communication is problematic and they have to be made aware of this. The ideal case of law enforcement would be that car drivers have to pay a fine every time when they endanger pedestrians, infringe yielding rules, and the like. To develop such a system seems difficult. Anyway, we psychologists should help to find solutions; educational, awareness-raising, infrastructural and other measures will have to be based on the sound understanding of human behaviour and interpersonal communication.

Part of the communication processes end up as more or less overt interpersonal conflicts. A large number of different types of conflicts between two road users occur at intersections and critical incidents or even accidents may result. For example, Kim et al. (2007) showed that more than 50 % of crashes involving a bicycle and another vehicle (a car in 70 % of the cases) occurred at an intersection. But the communication between road users has also the function to avoid conflicts and accidents. In fact, road traffic could never work without road

users who communicate, because not all movements and all interactions can be regulated to such a high degree as can be done in, e.g., road or air transport. Road users have in many cases to negotiate procedures with other road users. Psychology can and should assist in this area.

Infrastructure

Infrastructure affects behaviour of road users, no doubts. The difficulties lie in the detail of how this influence on behaviour takes place. Infrastructure provides certain limits and sometimes hinders safe traffic behaviour. E.g., a very low limit on a straight and broad road with little traffic will make it difficult to respect the speed limit, precisely as pedestrians will disrespect a red traffic light when there is no car traffic and the waiting time is long.

Maybe the road administration would know why certain regulations are necessary, but road users would not understand. Therefore, efforts needs to be made to design road environment in a reasonable way, because infrastructure influences the behaviour of road users constantly: the mentioned wide and straight roads encourage higher speeds, suggest (psychologically) priority at crossings, draw the focal attention to the front and therefore worsen peripheral vision in the immediate vicinity.

Fig. 2: Horizontal vs. vertical (Source: Swedish National road administration; Carl Jirg)



Nice and smooth surfaces on vehicle lanes may have negative impact on traffic behaviour, etc. (see Muhlrad, 2000; Theeuwes et al., 2012; and many more). Related to the fact that the environment or the surrounding affects us, it is interesting to speculate that we do not fear dangers of speed in the horizontal direction in the same (and natural) way as we do with risk deriving from gravity in the vertical direction, which in a particular situation leads to dead as well (www.vv.se; see fig. 2).

In conclusion, infrastructure can influence drivers' behaviour in such a way that risks are underestimated because of the impression arising from the road design (smooth and clean pavement, straight and wide roads, no trees on the roadside etc.). "A road that looks like a motorway will be used like a motorway." Infrastructural measures to enhance safe behaviour could consist of elements that support communication (see amongst others Falk et al., 2003; Gunnarsson, 2001); measures that reduce speed particularly at points where road users need to interact; arrangements which bring to mind traffic rules (e.g. Section Control) and the like. When speaking about infrastructure, important questions are: what kind of support does infrastructure offer for the use of different transport modes? How does infrastructure support the relations between different road users, and what are the communication processes that infrastructure supports? It is both impressions and physical facts that affect behaviour. For instance, to get a blow on the car from underneath if we drive over a hump too fast is a contingent reinforcement with a negative weight (or a contingent "punishment"). This is very efficient. However, infrastructure can also influence drivers' behaviour in such a way that risks are underestimated. "A road that looks like a motorway will be used like a motorway" even if this, for instance, is just outside a school. Infrastructure concepts that make use of infrastructure influences are

- self-explaining road;
- traffic-calming measures;
- shared space.

All of these are characterized by attempting to shape road user behaviour with the help of road and space design and supporting measures (information etc.).

One could say that traffic-calming activities were "invented" in densely inhabited areas with this goal: What was to be calmed was not traffic generally, but motor-vehicle traffic. The reason for this was that motor-vehicle traffic was increasingly experienced as disturbing all other functions that roads in urban areas also have to have. In order to support these other functions, first of all, speeds of motor-vehicles have to be reduced with the help of infrastructure, smooth driving has to be enhanced, and a replacement of a certain portion of motor-vehicle driving by walking and cycling (in combination with public transport) should take place. This potential according to work carried out in the frame of EU projects is quite considerable: According to a study done in the frame of the EU-project WALCYNG (Hydén et al., 1997) 50 % of all trips in Europe are shorter than 5 km (= 10 to 15 minutes by bike), and

15 % to 20 % are shorter than 1 km (10 to 15 min walking). New research in England (Le Vine & Polak, 2009) supports this.

With respect to the social and human sciences perspective, there is a general assumption that reflects certain conflicts between different interests of road users/citizens: Car drivers tend to dislike e.g., traffic-calming when they sit in the car; but they tend to appreciate such measures as residents. At the same time, traffic calming provides better life quality both for all non-motorised road users and for residents in the calmed areas. How is this point of view generated? The following arguments focus on non-motorised road users, to start with: Better conditions for non-motorised road users such as less noise and less pollution are of course appreciated (Risser & Wunsch, 2003). They can lead to a different use of the road space, reflecting liveliness and attractiveness, and even car drivers agree that the optic attractiveness, i.e. the aesthetic state of a road is important (see Falk et al., 2003). All the mentioned variables are related to life quality (Ausserer & Risser, 2003). In summary good infrastructure quality can improve quality of life.

Vehicle features/mode characteristics

Vehicle features are very much affecting behaviour. For instance, car devices controlling speed are nowadays designed in a way that the driver gets very little feedback concerning speed. Noise, vibrations, head wind, physical effort and other feedback from outside have stepwise vanished (Risser & Petica, 1998). Thus, how we behave, especially with respect to speed, is easily subject to erroneous assessment. Also, more generally, mode characteristics contribute to road user behaviour and communication. For instance, the “walking” vehicle, our body, gets tired easily and is very much susceptible for physical efforts, long distances, steep stair cases etc. As for the characteristics of bicycles, for many years there have not been much weight put upon the subject with respect to the easy use, like usefulness for shopping, good lights, etc. In modern cars there is little feedback concerning, e.g. speeds: Reduced motor sound, vibrations, wind and other feedback from outside (Grant et al., 1990; OECD Study). Vehicle characteristics/mode characteristics also affect traffic safety: e.g., according to older literature, strong and fast cars are more involved in severe and fatal crashes than smaller and weaker ones. Studies from the US show that SUVs are driven in a more problematic way than “normal” cars (Rudin-Brown, 2006; Walker et al., 2004; White, 2004) and that they are more involved in accidents, as well (AAAM, 2003). Thus, it is important to examine the motives for vehicle use and give support to the right ones that take place in the public space where everybody should be safe. Problematic motives need to be discussed both in public but also in the frame of rehabilitation measures. Striving for status, displaying a dynamic driving style, or trying to dominate others with the help of the vehicle causes problems for traffic safety. Car advertising often supports problematic and questionable motives but with the help of psychological science, traffic safety and traffic quality should be improved by focusing on problematic motives in a science-based way.

When planning, those who are in charge need to take into consideration how mode or vehicle features influence behaviour and communication of road users.

Vehicle equipment is of course also subject to critical screening. For instance in cars, a better feedback about speed is necessary; more than just the information from tachometer is needed. At the same time, adaptation and compensation effects linked to safety enhancing equipment have to be considered: delegation of responsibility, imitation processes, risk compensation, etc. Not least, the cut-down of communication that the new equipment will possibly generate need to be thoroughly analysed. It could be the case that drivers' attention to the human-machine-interface takes away attention from the "real" social environment.

Conclusion

The mentor, Ralf Risser, introduced the idea of widening the field of traffic psychology. The traditional fields of driver diagnostics and of rehabilitation of persons who had lost their license because of various law infringements must be dealt with, of course. But in addition, factors lying outside the person and affecting his/her behaviour as road user should be taken into consideration, according to the diamond model presented in the text. With the help of this model, important areas that traffic psychology could/should cover were identified and new possible work areas were discussed.

Concerning work with the individual, issues like treatment of anxiety after traffic accidents of professional drivers, driver education or the question of the exploration interviews in connection with drivers' diagnostics were taken up.

As far as societal impact is concerned we discussed the effects of cultural background in road user behaviour (also two project proposals, targeting this topic, were written), we dealt extensively with the topic of police enforcement, closely connected to the status of the police in the Czech Republic, and we tackled the role and organisation of effective and efficient first aid and how difficult it is to involve citizens in this process.

Concerning communication between road users, there was a project carried out in Olomouc dealing with the communication between pedestrians and car drivers; this topic will most likely be a part of habilitation of Dr. Matúš Šucha, one of the participants in the mentoring program.

Infrastructure aspects were examined in connection with Šucha's study and Risser had a presentation about walking as a transport mode and about traffic-conflict techniques, where the role of infrastructure was a prominent issue. Infrastructure should not be planned without knowledge of human behaviour.

Vehicle and mode were not discussed very much (except about walking as a mode with specific needs and exigencies). The role of Advanced Driver Assistance Systems (ADAS) and

of In Vehicle Information Systems (IVIS) was mentioned and discussed too; e.g. in Risser's lecture about road safety possible adverse effects of ADAS and IVIS (delegation of responsibility etc.).

"Widening the field" also refers to the fact that we did not merely deal with car drivers and car driving, we did not do "car-driver psychology" but traffic psychology. Psychology has to deal with the needs and preconditions of all types of transport modes, and as far as sustainability is concerned, traffic psychology needs to deal with the question how mobility behaviour can be changed into a more sustainable one.

Not least, population have to be considered too. Just dealing with transport itself, without considering living conditions and all other functions of public space apart from transport might end in a dead-end road and miss the main goal: Places where people live must provide a good living quality.

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Authors' CV

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She is a masters student of psychology at FF UP in Olomouc. While co-operating with the Transport Research Centre, Veterinary Research Institute in Brno, she has been involved in drivers' rehabilitation projects, risk perception, and projects related to driving schools and traffic safety. She has been working as an academic assistant of traffic psychology at the Department of Psychology at FF UP in Olomouc. She completed the internship in traffic psychology, traffic safety of tram transport in the EU in Lyon, France in 2013. The same year she attended a course of traffic psychology, ICTCT's seventh International Course for Early Career Road Safety Researchers in Maribor. Since 2014 she participated in co-operation with FF UP on a Green University Project which concerns the increase of traffic safety, life quality of citizens and ecological sustainability.

Darina Havlíčková

She graduated at the Faculty of Art of Masaryk University Brno (2006). Since 2009, she has been working in Transport Research Centre (CDV). She has participated in international projects (CLOSE TO, DRUID etc.) and in national projects for the Ministry of Transport and Ministry of Interior related to human factors in traffic, especially psychological aspects in traffic safety. She is a student of the doctoral program (Clinical psychology) at the Palacký University since 2012. She focuses on drivers after the crash, especially urban transport drivers. She is a graduate in transport psychology at Palacký University (2012) and integrative psychotherapy training for group work at the Institute for group psychotherapy INSTEP (2014).

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Veronika Kurečková graduated in psychology in 2004. She focused on organisational psychology and worked as a researcher, coach, trainer and consultant in HRM for ten years. Since 2012 she has worked in Transport research centre as a researcher, therapist and trainer. She focused mainly on traffic psychology themes – stress of drivers, driving related fear, programs for traffic offenders etc. Her key interests are first aid issues. She works in research and development of new experience-based first aid training methods and their incorporation into the programs for drivers. She also examines the psychological aspects and processes related to the first aid that aim to achieve more motivation and effectivity in the work of rescuers and how to minimize the traumatic consequences of first aid provision. She is a member of the Czech Resuscitation Council and IFRC platform (International Federation of Red Cross and Crescent Societies).

Ralf Risser

Born and grown up in Lienz, Tyrol. Grammar school there, graduated 1967. Then studied in Vienna. Dr.Phil., registered traffic psychologist and health psychologist. Owner of FACTUM and founding member of INFAR, the Institute for driver's rehabilitation. PhD at University of Vienna (Psychology & Sociology), Assistant Professor, Lecturer both at the University and the Technical University of Vienna. Visiting professor at the Technical University in Lund, Sweden (from February 2005 to February 2013). 1993 to 2003 Convenor of the Task Force Traffic Psychology of the EFPA (European Federation of Psychologists' Associations), member of the EFPA Standing Committee Traffic Psychology representing Austrian Psychologists' Association since 2004. Involved in EU projects and national projects. Since 2011 president of the International Cooperation on Theories and Concepts in Traffic safety ICTCT, an international association registered in Vienna with members from 30 countries all over the world. Since October 2012 moderator of the mentoring working group between CDV (Brno), FACTUM Verkehrs- und Sozialanalysen OG (Vienna), and the Institute of Psychology of the Palacký University of Olomouc.

Focus: attitude- and acceptance matters, marketing and motive-research, driver diagnostics and rehabilitation. One of the main topics of work is the development and use of instruments that allow an adequate research of human motives as a basis for social management. Specialist for qualitative survey techniques behaviour observation (developer of the Wiener Fahrprobe and derivatives), for translation of observation data into measures, and for awareness raising measures.

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Kateřina Špriřarová is a masters student of psychology at Faculty of Arts MU in Brno. She focuses on traffic psychology and she has been co-operating with the Transport Research Centre on projects like REPADO – Rehabilitation programs for drivers and Matrix – stress coping strategies for public transport drivers. She is member of CEPCoS – Center for experimental and cognitive sciences at Department of psychology on Masaryk University where she focuses on human-computer interaction. She completed Wiener Fahrprobe course led by Professor Risser in 2014. At the same year, she attended APCPP conference – Application of Principles of Cognitive Psychology in Practice. She is working within the Traffic psychology working group led by Professor Risser. Currently, she is working on small projects with Department of Psychology, Palacký University in Olomouc.

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Lenka Šřámková devotes her professional work to psycho-diagnostics in social, police and traffic psychology. In 2012, she completed her studies in psychology and the same year she commenced her PhD studies. In 2013, she completed her postgraduate studies in traffic

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Matúš Šucha specializes in traffic psychology, the human factor in traffic in general, and in management consulting. His research focuses on traffic psychology, traffic safety, and especially on vulnerable road users. He is an accredited coach (Czech Ministry of Education, Youth, and Sports), traffic psychologist (Czech Ministry of Transport), psychotherapist (completed five-year training in integrative group therapy), and a EuroPsy mentor in traffic psychology. Moreover, he is active in postgraduate education in traffic psychology at the Palacký University in Olomouc. He teaches undergraduate psychology courses in management psychology and counselling, economic psychology, and traffic psychology. He is currently working within Traffic psychology working group lead by Professor Ralf Risser. He is a member of many leading international organizations focusing on road safety, for example ICADTS – The International Council on Alcohol, Drugs and Traffic Safety, HUMANIST VCE – Human Centered Design for Information Society Technologies, CIECA – International Commission for Driver Testing, TPI – Traffic Psychology International, DGVP – Deutsche Gesellschaft für Verkehrspsychologie, and ICTCT – International Co-Operation on Theories and Concepts in Traffic Safety.

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He works in the field of human factor in transportation, with specialization in traffic psychology and human behaviour in particular. His research activities cover applied traffic psychology, traffic safety and driver rehabilitation with focus on traffic offenders and drivers with driving-related fear. He is an accredited traffic psychologist (Czech ministry of Transport), psychotherapist (completed five-year training in integrative group therapy), and first aid mentor with specialization on traffic accidents. In addition, he is guarantor of traffic psychology lab at the Transport research centre in Brno. He is currently working within Traffic psychology working group lead by Professor Ralf Risser. He is a member of international organizations focusing on human factor in transportation, for example HUMANIST VCE – Human Centered Design for Information Society Technologies, CIECA – International Commission for Driver Testing, TPI – Traffic Psychology International and ICTCT – International Co-Operation on Theories and Concepts in Traffic Safety.

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