

ABOUT THE DIFFICULTY TO INFLUENCE DRIVER BEHAVIOUR - A PHD THESIS IN THE FRAME OF THE NOE HUMANIST

Christine Turetschek
FACTUM OHG
Danhausergasse 6/4; 1040 Vienna
christine.turetschek@factum.at

ABSTRACT: The current paper gives an insight in the sociological framework of a PhD thesis which focused on the driving behaviour of young car drivers. The idea is to give an insight in the theoretical framework, rather than to discuss the results of the work. Thus, after the basic ideas concerning mobility, an overview of the statistical reality of young car drivers will be given, followed by a suggestion how this specific target group might be motivated towards a safe behaviour in road traffic. Finally, the concept of the thesis will be wrapped up, again, in order to provide a comprehensive overview of the basic ideas.

1. INTRODUCTION

Having a deeper look on the national and international scientific landscape, traffic safety is quite a fundamental issue. Down to the present day the EU spent billions of € for traffic safety research. About 42.000 people lost their life on European roads in 2007 [1]. How can it be explained that all the efforts made in road safety work to reduce the accident risk of young car drivers do not generate the wished-for effects, represented, e.g., by the vision zero? One explanation might be that nowadays mobility and thus locomotion is so tightly linked to the car.

2. THE CAR – A MEANS OF TRANSPORT?

From a sociological point of view the term mobility implies much more than just locomotion. One can differentiate between social mobility, the movement of individuals between different social states ([2] & [3]) – on the same level or between different social levels, spatial mobility which implies circulation in terms of traffic as well as migration ([4] & [5]) but also cultural mobility, the change of language and ideas ([6], as cited in [7] ; see table 1). In literature, mobility is not only described as the movement of individuals, goods or ideas but also as an inherent desire of mankind [8]. Mobility in that sense is related to the feeling of freedom, autonomy and the self-esteem of an individual ([9], [10] & [11]). Furthermore, mobility in most of the cases accomplishes the purpose of satisfying needs (e.g. getting something to eat or satisfy social contacts), instead of being self-sufficient [5]. Keeping in mind the emotional aspects of mobility it does not seem that amazing that the car obtained the superiority in the modern traffic landscape.

The car is the means of transport that apparently promises unrestricted mobility. Using the car allows the driver to overcome big distances, rather fast, independently from timetables. Even downsides like traffic jams are accepted. This situation might be related to the feeling of cosiness; the car is experienced as a part of one's home [12]. Other feelings regarding the car are directly

related to the personality of the driver. It allows the driver to demonstrate his/her personality, state, attitude, etc. Consequently, the behaviour towards other road users might be influenced by the perception of ones own status in the traffic hierarchy, related to self esteem ([12] & [9]). At the same time, driving a car is sometimes compared to a “Micro-Flow” experience [13], a condition where the own ability perfectly fits the challenge of the situation. Another emotional state related to driving is the experience of thrill, which is described as emotion between fear and desire [14].

In a nutshell, nowadays mobility is strongly related to the activity of driving a car that itself is strongly related to emotional aspects (see table 1). Owning/using the car reflects much more than just the possibility to move in space. Thus, it can be assumed that this underlying factors influence drivers' behaviour on the road and might be one reason for the risky driving style for some of them.

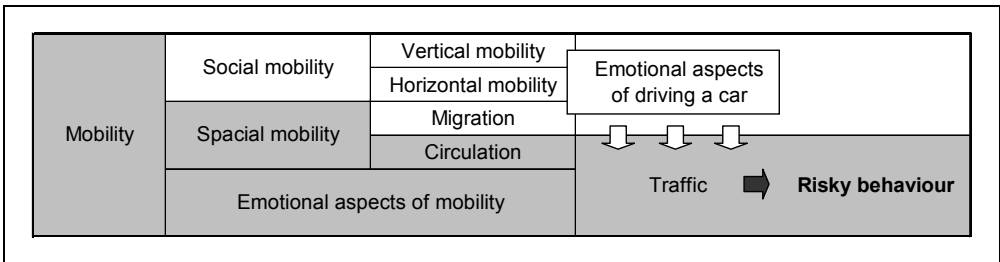


Table 1: How mobility leads to risky behaviour in road traffic [15]

Especially young drivers are affected by the described “extra” motives of the car, as this time of life in particular is characterised by seeking for acceptance, identity and social affiliation, but also for thrill. This assumption is reflected in the accident statistics as young car drivers are the driver group with the greatest accident risk.

3. YOUNG DRIVERS AND THEIR CRASH RISK

The risk to get involved in an accident is three times higher for 15 to 19 year olds, compared to the rest of the population [16]. In Austria in 2004, about 30% of fatalities and about 17% of crashes with injuries happened to young drivers, although this age group represent just 6% of the total population.

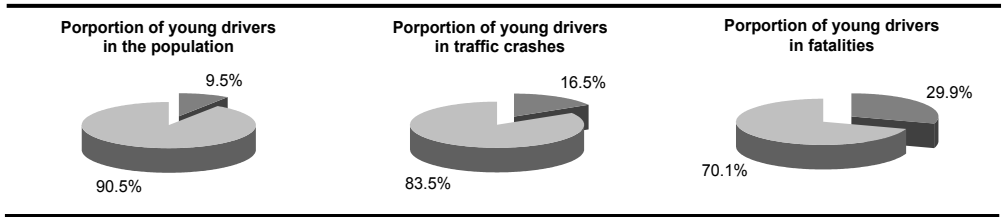


Figure 1: Proportion of young drivers in the population (17 to 24 year olds), in traffic crashes (15 to 19 year olds) and in fatalities (17 to 24 year olds) in Austria 2004 ([17], [16], as cited in [15])

Similar figures can be found for all OECD (Organisation for Economic Co-operation and Development) countries [17]. Most frequently young drivers are involved in single-vehicle crashes, loss-of-control crashes, alcohol related crashes. Most of these accidents, where young drivers are involved, happen, at night and/or on weekends ([18], [19], [20] , and many more). Again, not only in Austria but across the OECD countries male drivers have a higher accident risk than female drivers (see figure 2).

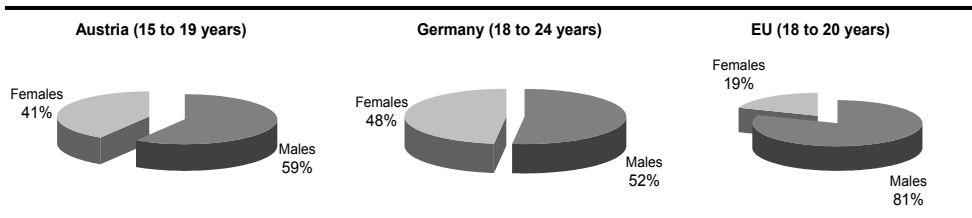


Figure 2: Accident risk of male drivers ([16], [21]; based on [22]; as cited in [15])

[23] explained the over-representing of young drivers in the accident statistics by differentiating between the “risk of being a novice driver” and the “risk of youth”. On the one hand young drivers do have a lack of experience and thus, become involved in risky situations more often and on the other hand they take the risk consciously. A similar explanation is given by [24] who hold the combination of inexperience, age, exposure to dangerous situations as well as risk-taking behaviour, responsible for the high accident risk of young car drivers.

Poorly adapted speed reflects the major risk in traffic for young car drivers as it is for the rest of the driving population. In Austria as well as in most of the developed countries about one third of all accidents are caused by an inappropriate speed choice of the driver ([25], [26] & [27]). By choosing a maladjusted speed, the probability as well as the severity of accidents increases [26]. Furthermore the driver reduces the possibility to detect hazards and to react on them in time. The field of vision is restricted [27] and the focus

tends to be more distant [28] due to higher speeds. The reaction channel as well as the stopping distance elongates, the faster one drives ([26] & [27]). However, not only speed itself, but also speed variances between various road users lead to a higher accident risk [27]. Many vulnerable road users have to bear that risk. In 2007 in Austria 7.9 % of injured and even 15.6 % of killed road users were pedestrians [25].

4. HOW TO PREVENT YOUNG DRIVERS FROM SPEEDING

Getting back to the issue of road traffic safety, one has to think about how young drivers can be motivated to show a co-operative behaviour on the road in order to decrease the accident rate and to protect vulnerable road users. Safety work can concentrate on the driver, the vehicle or the infrastructure. Nowadays, technical progress provides many systems such as ABS, cruise control, etc. intending to improve the traffic safety. There are also many possibilities to design infrastructure in such a way that behaviour becomes safer. To influence the speed behaviour in a positive way, a speed limiter like an Intelligent Speed Adaptation (ISA) system might be the measure of choice. Keeping in mind the motivational aspects of driving a car, traffic safety work needs to focus on the driver and his/her motives, as well. Thus, next to the implementation of a technical device, special training events might be necessary in order to question the underlying motives and attitudes of speeding such as time pressure, fun, excitement, etc. ([29], citing [30]; [31] as well as [32]).

ISA

Intelligent Speed Adaptation (ISA) systems have been investigated for more than 20 years. These systems inform the driver e.g. via visual or acoustic signals if exceeding the legal speed limit, warn the driver e.g. via haptic information like increasing counter pressure in the gas pedal or even intervene the driving task if one is driving too fast e.g. by reducing the fuel injection ([33], [34], [35] & [36]). Sweden plays an important role in the field of research and researchers there have been the forerunners worldwide, who conducted studies in order to examine the effects of this specific advanced driver assistance system (ADAS). In the meanwhile ISA became popular all over Europe (Great Britain, the Netherlands, Denmark, etc., [37]) and different types of the system were tested in several countries in real traffic as well as in simulators. All studies carried out indicate a positive effect of the ISA system on the driven speed. In most cases the ISA system reduced the average speed, it harmonised the speed behaviour and decreased the fuel consumption. In many studies no negative effect on the overall travelling time was identified. However, negative impacts on the following distance were recorded. Furthermore, it seems that other road users sometimes become irritated by single cars using an ISA system. Nevertheless, the acceptance of an ISA system throughout the studies was rather good [15].

Training

The concept of training contains the development of specific skills and competencies, whereas education focuses on cognitive knowledge transfer. In literature these terms are often used as synonyms and can not clearly be distinguished from each other. However, there exists some common sense

among researcher about how a well elaborated driving education should look like. Most favoured is a hierarchical approach that describes the driving task on three to four levels. The lowest level is about the car handling, followed by manoeuvring skills and a more strategical level aiming at trip planning for instance. One can also think about the influence of higher order goals in life on the driving behaviour, representing a fourth level. Thus, training – especially young drivers training - must not only focus on the ability to keep a vehicle on the road, but also to reflect what and how individual motives and attitudes influence the driving behaviour ([38], [39], [40], [41], [18] & [42]).

In most European countries, driver training aims at pre-licence adolescents. In Sweden the implementation of a graduated licensing system helped to reduce the crash risk up to 35 %. In Austria, the adoption of a multiphase driver training, including a psychological group discussion, led to a reduction of traffic accidents of young drivers. Voluntary trainings focusing on motivational and attitudinal factors in Germany ([43] & [44]), Sweden (“The Insight”, ([45], [46], [47] & [48]) and the Netherlands ([49]) showed a positive effect on the communication behaviour with other road users or the seat belt use but also felt more confident about their driving skills which may tempt them to drive beyond their skills. Summing up, theoretically it is very well known how a successful driver training should look like. In practice, however, one has to be very careful how the content is presented, as training measures have the potential to improve the driving behaviour of young car drivers but can backfire, as well.

5. SOCIAL VERSUS TECHNICAL ASPECTS OF LOCOMOTION

Looking back at what was said so far, mobility comprises a social as well as a technical aspect. Driving a car was described as rather motivational activity, not only satisfying the requirement of locomotion but meeting the need of other important desires like freedom, autonomy, individuality, etc., too. However, using a car is a rather “technical” way of moving compared to walking. Especially nowadays, where every now and then a new system is developed which can support the driver in the driving task, inform the driver about the best route or just entertain the driver, locomotion tightly is linked to technical features. Thus, both aspects of mobility – the social and the technical one – are part of our modern life and lead to different challenges we have to face.

As already mentioned in the introduction, one of the greatest disadvantages of our modern mobility behaviour is reflected by the 42.000 of people who died in EU-27 in road accidents. Most of these accidents are mainly caused by young car drivers due to poorly adapted speed and a risky driving behaviour. Road traffic safety work needs also to focus on this target group in order to improve the driving behaviour of young people and thus, reduce their accident risk. Various actions can be taken to influence the behaviour of young car drivers positively. For instance one can capitalize the technical progress and implement an Intelligent Speed Adaption system in the car to prevent drivers from speeding. As mobility, and thus driving, is highly related to emotions it is rather important not only to rely on a technical system but also to activate the sense of responsibility of the driver by implementing an adequate driver training, as well.

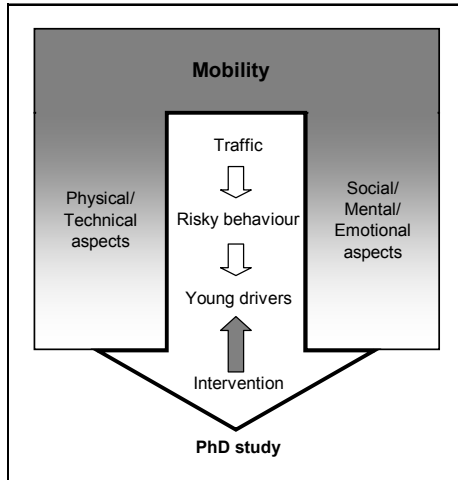


Figure 3: Theoretical framework of the current PhD thesis (based on a memo of Amann, 2009 ; as cited in [15])

Summing up, to positively influence the behaviour of especially young car drivers it seems to be important, to chose a broad-ranging approach. Thus not only technical features, like an ISA system should by implemented in the car to change the behaviour, but also a long-standing measure, targeting on awareness raising, e.g. with a training event,

6. PhD

The notions above shape the framework of a PhD thesis carried out within the scope of the NoE Humanist. In the thesis the question was investigated how the use of an Intelligent Speed Adaptation system (ISA) could influence the communication behaviour of young car drivers. As driving a car was seen not only as a technical matter but rather linked to emotional aspects, it was assumed that just implementing a system, might not be enough to change young drivers behaviour for a longer period of time. To focus on the motivational, emotional aspects of driving a car, a psychological training event was considered as method of choice in order to raise the awareness of the target group. Thus, the motives of the drivers were discussed in the frame of a psychological training in order to reflect underlying emotional aspects of driving a car. The results of the study were very promising and critical at the same time. On the one hand, especially less experienced young drivers seemed to benefit most of the ISA system. In particular, the communication behaviour with other road users improved while using the system. Thus, ISA might provide a substantial support for novice drivers and hence reduce their crash risk. On the other hand, ISA did not really affect the driving behaviour of the more experienced young drivers. Some other measures need to be implemented in order to reduce their crash risk.

7. REFERENCES

- [1] European Union Road Federation (ERF), Brussels Programme Centre (IRF), 2009: European Road Statistics 2009. http://www.irfnet.eu/media/stats/ERF2009%20European%20Union%20Road%20Statistics%20BOOKLET_V07_update.pdf, 18.10.2009.
- [2] Fuchs-Heinritz, W.; Lautmann, R.; Rammstedt, O.; Wienold, H., 1995: Lexikon zur Soziologie. Opladen: Westdeutscher Verlag.
- [3] Korte, H.; Schäfers, B., 2008: Einführung in Hauptbegriffe der Soziologie. Wiesbaden: VS Verlag für Sozialwissenschaften.
- [4] Bähr, J.; Jentsch, C.; Kuls, W., 1992: Bevölkerungsgeographie. Berlin: de Gruyter.
- [5] Zängler, T.W., 2000: Mikroanalyse des Mobilitätsverhaltens in Alltag und Freizeit. Berlin: Springer.
- [6] Sorokin, P.A., 1964: Social and Cultural Mobility. London.
- [7] Rammler, S., 2001: Mobilität in der Moderne. Geschichte und Theorie der Verkehrssoziologie. Berlin: Edition Sigma.
- [8] Geiger, G., 2002: Der Mensch als animal migrans. Zur Psychologie der Mobilität. In: Der Bürger im Staat. Heft 3. Baden-Württemberg: Landeszentrale der politischen Bildung.
- [9] Hilgers, M., 1994: Total abgefahren. Psychoanalyse des Autofahrens. Freiburg: Herder.
- [10] Vogt, W., 2002: Was ist und welchen Sinn hat Mobilität? Mobilität und gesellschaftliche Entwicklung. In: Der Bürger im Staat. Heft 3. Baden-Württemberg: Landeszentrale der politischen Bildung.
- [11] Opaschowski, H.W., 1999: Umwelt. Freizeit. Mobilität. Konflikte und Konzepte. Opladen: Leske und Budrich.
- [12] Haslinger, B., 2006: Gendertypisches Mobilitätsverhalten in der Freizeit – automobile Fortbewegung als Handicap. Ein evolutionstheoretischer Ansatz. Dissertation der Universität Wien.
- [13] Rheinberg, F., 1996: Flow-Erleben. Freude an riskantem Sport und andere „unvernünftige“ Motivationen. In: Kuhl, J.; Heckhausen, H. (Hrsg.), Motivation, Volition und Handlung. Enzyklopädie der Psychologie (C/IV/4). Göttingen: Hogrefe, 101-118.
- [14] Balint, M., 1959/1988: Thrills and Regression. Stuttgart: Klett-Cotta.
- [15] Turetschek, C., 2009: "Effects of ISA-like IST - applications on the communication behaviour of young car drivers in urban areas". PhD Thesis of the University of Vienna.
- [16] Kuratorium für Verkehrssicherheit, 2004b: Verkehrsunfallstatistik 2004. Jugendliche. Kuratorium für Schutz und Sicherheit. <http://www.kfv.at>, 01.02.2009.

- [17] Organisation for economic co-operation and development (OECD); European conference of ministers of transport, 2006b: Young Drivers. The Road to Safety. Paris: OECD. <http://www.internationaltransportforum.org/Pub/pdf/06YoungDrivers.pdf>, 22.11.2009.
- [18] Engström, I.; Gregersen, N.P.; Hernetkoski, K.; Keskinen, E.; Nyberg, A., 2003: Young novice drivers, driver education and training. Literature review. VTI rapport 491A. Linköping: Swedish National Road and Transport Research Institute. <http://www.vti.se/PDF/reports/R491A.pdf>, 01.02.2009.
- [19] Transport Accident Commission (TAC), 2008: Young driver statistics. <http://www.tacsafety.com.au/jsp/content/NavigationController.do?areaID=12&tierID=1&navID=CC348A57&navLink=null&pageID=171>, 14.11.2008.
- [20] European Road Safety Observatory (ERSO), 2006: Novice Drivers. www.erso.eu, 01.02.2009.
- [21] Statistisches Bundesamt, 2007: Verkehrsunfälle. Unfälle von 18- bis 24-Jährigen im Straßenverkehr. Wiesbaden: Statistisches Bundesamt.
- [22] European Road Safety Observatory (ERSO), 2008: Annual Statistical Report 2008. Workpackage 1, Task 3, SAFETYNET. www.erso.eu, 01.02.2009.
- [23] Mienert, M., 2002: Merkmale potenzieller Risikofahrer vor dem Führerscheinerwerb. Zeitschrift für Verkehrssicherheit, Heft 4, 2002, 145-150.
- [24] Smart, D.; Vassallo, S.; Sanson, A.; Cockfield, S.; Harris, A.; Harrison, W.; McIntyre, A., 2005: In the driver's seat. Understanding young adults' driving behaviour. Commonwealth of Australia: Australian Institute of Family Studies.
- [25] Kuratorium für Verkehrssicherheit, 2008: Verkehr in Österreich. Verkehrsunfallstatistik 2007. Kuratorium für Verkehrssicherheit, Heft 40. <http://www.kfv.at>, 01.02.2009.
- [26] Global Road Safety Partnership (GRSP), 2008: Speed management: a road safety manual for decision-makers and practitioners. Geneva: Global Road Safety Partnership. www.GRSProadsafety.org, 01.02.2009.
- [27] Organisation for economic co-operation and development (OECD); European conference of ministers of transport, 2006a: Speed Management Report. Paris: OECD. <http://www.internationaltransportforum.org/Pub/pdf/06Speed.pdf>, 01.02.2009.
- [28] Berger, W.J., 1996: Informationsaufnahme im Straßenverkehr. PhD Thesis, Universität für Bodenkultur, Austria.
- [29] Stradling, S.G.; Campbell, M.; Allan, I.A.; Gorell, R.S.J.; Hill, J.P.; Winter, M.G., 2003: The speeding driver: who, how and why?. Scottish Executive Social Research. Transport Research Series. <http://www.scotland.gov.uk/Publications/2003/08/17977/24935>, 1.02.2009.

- [30] Silcock, D.; Smith, K.; Knox, D.; Beuret, K., 2000: What Limits Speed? Factors That Affect How Fast We Drive. Final Report. AA Foundation for Road Safety Research.
- [31] Furnham, A.; Saipe, J., 1993: Personality correlates of convicted drivers. *Personality and Individual Differences*, 1993, Vol. 14 (2), 329-336.
- [32] Gabany, S.; Plummer, P.; Grigg, P., 1997: Why drivers speed: The speeding perception inventory, *Journal of Safety Research*, 1997, Vol. 28 (1), 29-36.
- [33] European Transport Safety Council (ETSC), 2005: In-Car Enforcement Technologies Today. http://www.etsc.eu/documents/ETS_brochure_4.pdf, 23.11.2009.
- [34] Office of Road Safety (ORS), 2008: Fact sheet ISA. <http://www.officeofroadsafety.wa.gov.au/documents/FactSheetISAJan2008.pdf>, 20.10.2008.
- [35] Young, K.; Regan, M., 2002: Intelligent Speed Adaptation: A Review. Road Safety Research, Policing and Education Conference. <http://www.rsconference.com/pdf/RS020049.PDF>, 03.11.2004.
- [36] <http://www.isaweb.be/english/ISA-trials/index.html>
- [37] Jamson, S.; Carsten, O.; Chorlton, K.; Fokes M., 2006: Intelligent Speed Adaptation - Literature Review and Scoping Study. UK: University of Leeds; MIRA Ltd; TfL. <http://www.tfl.gov.uk/assets/downloads/Intelligent-Speed-Adaptation-Literature-Review-and-Scoping-Study-Jan-2006.pdf>, 15.03.2009.
- [38] Michon, J.A., 1985: A critical view of driver behaviour models: What do we know, what should we do? In Evans, L.; Schwing, R. (Eds.), *Human Behaviour and Traffic Safety*. New York: Plenum Press.
- [39] Christie, R., 2001: The effectiveness of driver training as a road safety measure: a review of the literature. Report No. 01/03. RCSC Services Pty Ltd. <http://www.racv.com.au/wps/wcm/resources/file/eb678a4a1fa3e99/The%20Effectiveness%20of%20Driver%20Training%20-%20Lit%20Review.pdf>, 15.03.2009.
- [40] Gregersen, N.P.; Bartl, G., 2004: EU MERIT Project. Working paper for Workshop I. Driving instructors' education in Europe: a long-term vision. http://www.gutefahrt.at/merit/pdf/01_MERIT_working_paper_1_FINAL_en.pdf, 27.11.2008.
- [41] Trainer, 2001: System for driver Training and Assessment using Interactive Evaluation tools and Reliable methodologies. Deliverable 2.1.
- [42] Hatakka, M.; Keskinen, E.; Gregersen, N.P.; Glad, A., 1999: Theories and Aims of Educational and Training Measures. In: Siegrist, S. (Ed), 1999: *Driver Training, Testing & Licensing – towards theory-based management of young drivers' injury risk in road traffic*. Results of EU Project GADGET, Work Package 3. Bern: Schweizerische Beratungsstelle für Unfallverhütung (BFU).

- [43] Stiensmeier-Pelster, J., 2002: Evaluation des Modellversuchs "Integratives Konzept zur Senkung der Unfallrate junger Fahrer und Fahrerinnen" im Land Niedersachsen. In: Panosch, E. (Hrsg.), Driver Improvement. 7. Internationaler Kongress. Wien: KfV, 165-175.
- [44] Stiensmeier-Pelster, J., 2005: Integratives Konzept zur Senkung der Unfallrate junger Fahrer und Fahrerinnen. Mensch und Sicherheit, Heft M170. Bergisch Gladbach: Bundesanstalt für Straßenwesen.
- [45] Gregersen, N.P., 1995: What should be taught? Basic vehicle control skills or higher order skills? In: Simpson, H.S. (Ed) (1996). New to the Road: Reducing the Risks for Young Motorists. Proceedings of the First Annual International Conference of the Youth Enhancement Service, June 8-11 1995. (pp103- 114.).University of California: Los Angeles.
- [46] Gregersen, N.P., 1996: Young drivers' overestimation of their own skill: An experiment on the relation between training strategy and skill. Accident Analysis & Prevention, 1996, Vol. 28(2), 243-250.
- [47] Gregersen, N.P., 1997: Evaluation of 16-years age limit for Driver training. First report. Report No. 418A. Linköping, Sweden: VTI (Swedish National Road & Transport Research Institute).
- [48] Nyberg, A.; Engstrom, I., 1999: The driver training concept "The Insight" – an evaluation. VTI Report No. 443A (English Summary). Linköping: VTI (Swedish National Road & transport Research Institute).
- [49] Goldenbeld, C.; Hatakka, M., 1999: Voluntary advanced driver training. In: Siegrist, S. (Ed), 1999: Driver Training, Testing & Licensing – towards theory-based management of young drivers' injury risk in road traffic. Results of EU Project GADGET, Work Package 3. Bern: Schweizerische Beratungsstelle für Unfallverhütung (BFU).