

## **DETERMINANTS OF DRIVERS' RISKY BEHAVIOUR**

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### ***Abstract***

*Despite the considerable amount of research on the behaviour of drivers in road traffic the problem of defying psychological and physical features of a good driver is still exactly unsolved. Apart from physical features, which limit or preclude from operating a car, there are psychological traits, which influence drivers' behaviour. Taking into account three basic aspects of proficiency in driving: physical fitness (determined during the medical examination), mental attitude (determined during the psychological examinations testing of mental predisposition for driving a vehicle), knowledge, skill and attitude of a driver. The mental traits seem to be even more important than physical fitness, knowledge or divers' skills.*

*This article presents, in particular, reasons for and predictors of risky behaviours in road traffic with a focus on variables of personality features, which potentially are the reason for hazardous behaviour. The results showed the existence of statistically significant differences in temperament and type of psychological gender between drivers demonstrating a tendency to risky behaviour on the road and those who do not have such tendencies. Also the analyses of the researches had given numerous interesting conclusions on relations between personality differences of drivers who like to take risk and the ones who do not have such inclinations. Additionally, the differences of character in the aspect of evaluating behaviours as risky were presented.*

**Keywords:** drivers, road transport, risky behaviour, personality

### **1. Introduction**

Driving a car is an activity, which requires some particular psychological and physical predispositions, concerning not only one's self-esteem as a driver, but also the ability to adjust one's behaviour to changing conditions. There is no unique traffic psychological theory explaining the mechanism of driver's behaviour. Predominantly, the impact is put on physical fitness, motivating factors, cognitive abilities, emotions that can be evoked by a particular situation and risk acceptance.

In European languages, the word "risk" derives from Italian "rischio" which means exposing oneself to possibility of occurring situations of an adverse effect [7]. Risk is generally defined as a function of loss - consequences, threats - and probability of its occurrence [8], [9].

According to P. Drucker [11] four kinds of risk can be distinguished:

- 1) The risk one must accept - the risk that is built into the nature of the business. They are, for example: taking part in road traffic, raising children, using electricity. The majority of them is inevitable.
- 2) The risk one can afford to take. That kind of risk is relatively low and can to some extent, be controlled. E.g. practising recreational sports, taking part in lotteries.
- 3) The risk one cannot afford to take. It is beard in situations when the success depends on luck and consequences can be very grave, for example overtaking on curve lines.
- 4) The risk one cannot afford not to take. That kind of risk is taken when one must choose between two bad solutions, when risky behaviour can potentially save one's life. For instance jumping into cold water to save somebody sinking or donating organs.

## 2. Risky traffic behaviour

In models, which emphasize the role of risk as a main determinant of traffic behaviour, it is important that road traffic is always assessed as a subjective risk; however, the level of risk acceptance is individual and results from one's need of stimulation and activity. When one's subjective and objective level of risk are disparate, he or she will have a tendency to eliminate that disparity. This mechanism is strictly conditioned by one's experience as a driver. One's objective risk acceptance level forces the person to adjust his or her behaviour and the acceptance of risk is seen as independent from the person. Therefore, a collision or traffic accident are seen as an unwanted situation, which is only slightly dependent or even independent from our actions [4].

There is no strict definition of risk in road traffic. Generally, it is defined as "a combination of probability of occurrence of a traffic accident and the size of personal, economical and environmental loss which the accident causes". This approach was defined by European Road Assessment Programme [1].

Such attitude emphasises that the risk is always connected with the driver's choice – to take the risk or not to (driving with excessive speed, overtaking on blind corner etc.) being aware of the fact that therefore an accident may occur. Not taking the risk means trying to reduce the risk or eliminate it through reducing speed and adjusting behaviour to traffic conditions.

There is a distinction between risk and threat in road traffic. A threat is defined as a possibility of loss occurrence provided some certain conditions which will lead to a traffic accident. In case of human factor, it means, for instance, a possibility of getting into an uncontrolled slide on a slippery road while driving with an excessive speed and, as a consequence, fall into a ditch. The sources of possible threats on the road are road infrastructure, the vehicle itself, human, traffic and outside conditions, for instance risky traffic behaviour.

Two sorts of risk are distinguished: social risk and individual risk. The second one concerns each single road user. Its measure is the concentration of fatal and serious accidents – the number of accidents to every 1 billion kilometres driven per year. The social risk concerns the society as a whole or a group of road users. The measure of social risk is generally the number of fatal and serious accidents per one kilometre in 3 years period [1].

The definition of risk in road traffic directly refers to drivers' and other users' risky behaviours. They are the main risk factors, which means that the driver decides whether he or she behave safely or not. From the analysis on traffic accidents reasons, the most often indicated driver factors which lead to traffic accident are (the number of accidents caused by driver's risky behaviour is given in the brackets) [12].

- not driving for the conditions (8 550),
- not respecting the right of way (7 922),
- dangerous overtaking (1 759),
- inappropriate behaviour towards pedestrian (4 380),
- turning carelessly (887),
- careless reversing (592),
- careless line changing (635),
- turning back carelessly (175),
- driving the wrong side of the road (664),
- driving without obligatory lights turned on (51),
- running a red light (460),
- keeping too close to front vehicle (2 120),
- emergency braking (197),
- disobeying traffic lights and signs (99).

The other reasons are:

- driving after drinking, under influence or after taking medicaments which can influence the ability to focus on driving;
- using mobile phones while driving.

All of these directly depend on driver behaviour and they result from driver's errors and deliberate actions.

### **3. Determinants of risky behaviours – research**

The research was conducted on a group of 142 people who participated in a course for drivers who had made several traffic violations (that course enables to reduce penalty points in driving licence). Three main tools were used, selected on the basis of their psychometric capabilities to measure road traffic risk and simultaneously analyse personality features of the participants. The IVE questionnaire by S. and H. Eysenck was used, as it measures impulsiveness, venturesomeness and empathy. Since impulsiveness and venturesomeness are presumed to contribute to risk preferences, it is used both as a measure of personality constructs and as a measure of risk preferences. The second questionnaire used was PTS – The Pavlovian Temperament Survey – by Strelau, Zawadzki and Angleitner, which is based on different types of nervous systems by Pavlov. In his work, Pavlov hypothesized on differences between individuals and could they be reduced to different combinations of the nervous systems. The features, which he distinguished, are basic nervous system processes of – excitation, inhibition, activity and balance between these processes. The process of excitation refers to efficiency of basic nervous system in the context of its functionality as the ability of nerve cells to work efficiently.

The third tool of our research was a questionnaire on individual risk preferences in road traffic. This tool has proved its effectiveness in previous researches, so it was decided to use it in this case as well [5]. Besides questions on behaviour towards other road users and pedestrians, approach towards speeding or driving under influence of psychoactive substances, participants of the research had to choose which of the given behaviours they concern as dangerous. The view on ways of driving and behaviour towards other road users are rarely used in literature and there are few elaborations concerning them. Furthermore, the problem of aggressive or risky traffic behaviour is burdened with subjectivism of interpretation, which directly influences the difficulty of defining risk in road traffic. The following chart presents results of a questionnaire in which drivers had to evaluate which of the behaviours given they concern as dangerous.

In the context of analysis on risk, as shown in Fig 1., the majority of the participants had chosen *driving after drinking* and *turning into the path of other vehicle* as the most dangerous behaviours. Moreover, a significant group had concerned as tendency to risk the following: *close following, not fastening the seat belts, speeding, talking on mobile phone (while driving), frequent lane changes and running a yellow light*. What is interesting, the majority of participants did not concern starting with screeching tires as risky. The analysis made resulted in defining personality variables of drivers according to their risk tendency.

### **4. Predictors of risky behaviour – conclusions from the research**

The aim of our research was to answer the question: which parameters influence the most drivers' inclination to take risk. The first step was to determine significant correlations between the level of acted risky behaviours and the results from IVE and PTS questionnaire. A search on linear relationship between all parameters was made. A statistically significant positive correlation between level of aggressive behaviours and *Impulsiveness* and *Inclination to Take Risk* was detected. Additionally a negative correlation between level of aggressive behaviours and inhibition processes was found. These findings mean that the higher level of one's *Impulsiveness* and *Inclination to Take Risk* is the more often will they behave risky in road traffic. The correlation

between risky behaviours and strength of inhibitory processes means that the tendency to take risk is strictly correlated to low level of inhibitory processes.

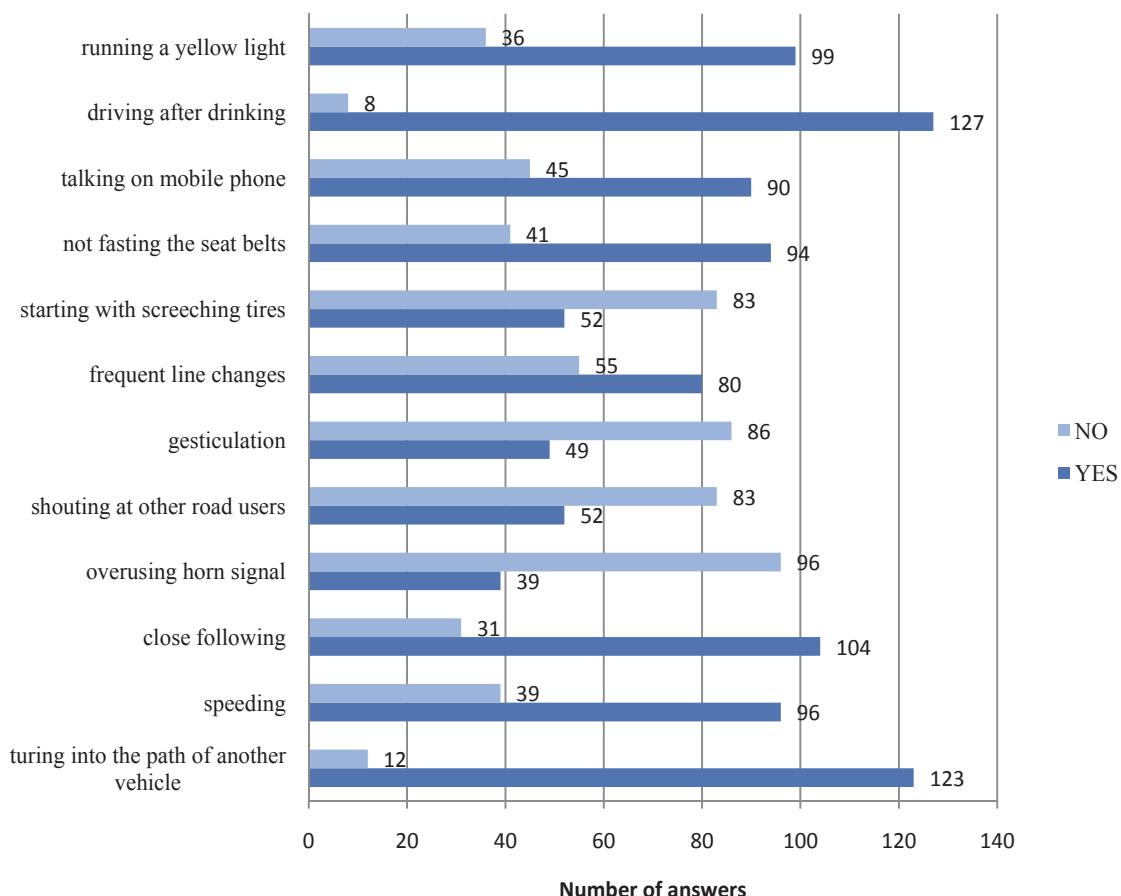


Fig. 1. Which of the listed behaviours you concern the most dangerous? (own research)

In order to make further analysis on correlations between personality variables measured with IVE and the strength of nervous system processes measured with PTS, a linear regression analysis was made. The aim was to define the most significant predictors of aggressive behaviours. The linear regression analysis has proved to be statistically significant ( $F(2.121)=18.815$ ;  $p<0.001$ ) and explaining 22.5% of all variances. In the process of analysis following predictors were excluded as variables having not significant influence on variability of behaviour or not having a straight relation with it. They were *Impulsiveness*, *Empathy*, *Strength of Excitatory Process* and *Mobility & Ability of the Nervous Processes*. On the other hand, *Inclination to Take Risk Beta = 0.424* and accompanying *Strength of Inhibitory Processes* (SPH) *Beta = -0.277* turned out to be the most significant predictors. That result means a driver is more prone to behave risky on the road when low Strength of Inhibitory Processes accompanies his or her high Inclination to Take Risk.

In next stages, an analysis on differences between personality and preferences in aggression and traffic risk taking was made. The differences between drivers' characteristics and their approach towards behaviours on the road, which are widely considered to be dangerous, were verified.

Drivers who concern speeding as risky have much lower results at *Impulsiveness* and *Inclination to Take Risk*. The similar relationship was detected in all PTS questionnaire's scales, such drivers had low results in *Strength of Excitatory* and *Inhibitory Processes* as well as in *Mobility of the Nervous Processes*. Further analysis was made on the way of defying risk by

drivers themselves and if it is dependent on their personality features.

The most significant differences, detected in examined groups were *Inclination to Take Risk* measured with IVE and *Mobility of the Nervous Processes* to give one impulse priority over another – one of the PTS's scales. What is interesting is the fact that drivers who concern “turning into the path of other's vehicle” as risky tend to have higher inclinations to take risk. This result is consistent with theoretical assumptions, according to which tendency to take risk is strictly correlated with the awareness of existing threats.

The analysis on groups of drivers divided according to their opinion on “close following” has shown significant differences as well. Participants who concern that behaviour as not risky tend to have higher *Mobility of the Nervous Processes*, which in practice is consistent with theory – as an ability to change attention from one situation to another or from passive state to active state and the opposite. These drivers also had higher level of *Impulsiveness*, which mean that they are totally unable to predict consequences of their actions. Such combination can be crucial to create hazardous situations on the road (e.g. not keeping an appropriate distance to vehicle in front) which can result in road collisions and accidents.

Another analysis was made on the strategy, relatively commonly taken by drivers as an expression of frustration, which is overusing the horn signal. In this case, the differences between all personality groups turned out to be inconsiderable. It is however, worth noticing that drivers who consider this strategy as risky have higher *Empathy* rates than the ones who share the opposite opinion. The empathy is an affective reaction, which arises from seeing, or understanding the emotional state of the others, it is the capacity to recognize emotions, which are currently experienced by another person. The definition of empathy covers not only the cognitive abilities but also affectivity. In this context, a driver with higher level of *Empathy* is more likely to understand the other driver's conditions. Therefore, it seems that an empathic road user is less likely to use horn than the driver who has not the ability (or willingness) to recognize other drivers' emotions.

The last analysis was made on the traffic behaviours that are widely considered as risky. The subjects of analysis were individual differences between drivers who share the opinion on traffic risky behaviours and drivers who think the opposite. The first case was “frequent lane changes”. The subjects who concern it as risky had higher results in *Strength of Inhibitory Processes* and *Empathy*, at the same time they had lower *Inclination to Take Risk* and *Impulsiveness*. The researches on the use of IVE questionnaire and its relation to other measures used in researches on personality has proved that the only positive correlation of *Empathy* is with *Neuroticism*, which is negatively correlated with the risk [3].

An interesting reference has been observed in the research on evaluation of conditions, which are directly related with exposition to danger and risk. The subject of research were differences between two groups of drivers. The division was made according to drivers' opinion on risky behaviours, which are mandatory – not fastening the seat belts, driving after drinking or talking on mobile phone while driving. First group did not consider that kind of behaviour as dangerous despite potential fine, second group considered them as dangerous. Drivers from the first group, who did not consider “not fastening seat belts” as dangerous had higher results in *Impulsiveness* and *Inclination to Take Risk*, while having lower results in all PTS scales. Similar relations had been detected according to drivers' opinion on talking on mobile phone while driving. However, drivers who did not consider driving under influence as dangerous tended to have higher level of *Strength of Inhibitory and Excitation Processes* and lower level of *Impulsiveness*. This observation is significant since *Impulsiveness*, as one of the IVE questionnaire's scales is related with lack of predicting consequences of one's actions. It means that people with lower level of *Impulsiveness* are expected to be able to predict future consequences. However, drivers who did not consider driving under influence as dangerous had low level of *Impulsiveness*. What is worth being noticed is the fact that the presented opinions were based on self-reports. It means that the real actions of

drivers do not have to be the same as their declarations.

The last aspect, which was analysed, was drivers' approach towards running a yellow light. In this case, drivers who concern it as unnecessary risk tend to have higher results in all IVE and PTE questionnaires' scales. However, the level of *Empathy* is an exception, since it is lower for drivers who claim that running a yellow light is not dangerous.

## 5. Summary

The results of the researches presented above had given numerous interesting conclusions on relations between personality differences of drivers who like to take risk and the ones who do not have such inclinations. Additionally, the differences of character in the aspect of evaluating behaviours as risky or not were presented.

The analysis had shown that the strongest predictors of inclination to behave risky are: *Inclination to Take Risk* measured by IVE questionnaire and *Strength of Inhibitory Processes* – a part of PTS test. This relation means that the higher the level of one's *Inclination to Take Risk* is, accompanied by lower *Strength of Inhibitory Processes*, the more prone to behave risky is that person as a driver. The lowest level of *Strength of Inhibitory Processes*, as the analysis had proved, was the attribute of drivers who are frequently fined for traffic violations. The individuals with low level of *Strength of Inhibitory Processes* are hardly able to develop inhibition of behaviour and are not capable of keeping the inhibition for a long time period, which manifests itself in disorders in behavioural inhibition system and disorders in all behaviours. The person who has high level of *Strength of Inhibitory Processes* can easily develop and keep the inhibition for a long period of time.

A sequence of analysis had shown the significant role of *Impulsiveness*. The high level of this parameter is strictly correlated with risky driving behaviours. The more often drivers were fined for traffic violations such as speeding, the higher results did they obtain in the categories of *Impulsiveness* and *Inclination to Take Risk*. Impulsive people (type P), according to authors of that theory, are unable to predict the consequences of their behaviour, while people who are inclined to take risk (type E) are fully aware of the danger resulting from their actions. It is worth highlighting that research with the use of IVE questionnaire was preceded by research on psychoticism – the fourth of personality traits. Psychoticism was there treated as the second nature of extroversion. An important element of extroversion is the impulsiveness, which plays a regulatory role in one's life – from its strength the tendency to take or not to take certain actions results – e.g. criminal activities (Pospiszył, 1985). *Impulsiveness*, similarly to *Extroversion*, is of complex structure, consisting of two groups of characteristics: impulsiveness and risk. In this context, impulsiveness means spontaneity, abandon and reluctance to planning and stabilization. Risk means striving for adventures, intensive experiences and a need of strong stimulation [2].

*Impulsiveness* is therefore, according to reasoning presented in this article, an abnormal and pathological aspect of traffic behaviour. *Inclination to Take Risk* are the actual risk taken while driving (a component of extroversion). The results of our research, presented in this paper, had proved the relation between results of IVE questionnaire and actual risky behaviour on the road. Every road user should be aware of the fact that he or she is dependent on other drivers – with different level of experience, reflex and skills. Decisions made while driving are strictly related with different aspects of road traffic as a whole. This fact is particularly important, as the behaviour on the road is difficult to change. The driver who drives with excessive speed, drives under influence or do not fasten the seat belts considers himself as a good driver of high skills who is independent from any safety issues. Predominantly it results from individual perception of risk.

## References

- [1] EuroRAP, European Road Assessment Programme <http://www.eurorap.pl/index.php?option=com>

- content&view=article&id=64&Itemid=53, 29.11.2012.
- [2] Eysenck, H., *The definition of personality disorders and the criteria appropriate for their description*, Journal of Personality Disorders, 1, pp. 211-219, 1987.
  - [3] Eysenck, S. B. G., Pearson, P. R., Easting, G., Allsopp, J. P., *Age norms for Impulsiveness, Venturesomeness and Empathy in Adults*, Personality and Individual Differences, 6, 5, pp 613-19, 1985.
  - [4] Huguenin, R. D., Rumar, K., *Models in Traffic Psychology*, [in:] P. E. Barjonet (Ed.), *Traffic psychology today*, Kluwer Academic Publishers, Boston 2001.
  - [5] Odachowska, E. (red.), *Psychologia zachowań ryzykownych w ruchu drogowym - Monografia*. Wydawnictwo ITS, Warszawa 2012.
  - [6] Pospiszyl, K., *Psychopatia*, PWN, Warszawa 1985.
  - [7] Ratajczak, Z., *Kontrowersje wokół pojęcia ryzyka. Źródła i konsekwencje* [in:] R. Studenski (red.), *Zachowanie się w sytuacji ryzyka*, Wydawnictwo Uniwersytetu Śląskiego, pp. 13-19, Katowice 2004.
  - [8] Sayers, P.B., Gouldby, J.D., Simm, I., Meadowcroft, I., Hall, J., *Risk, Performance and Uncertainty in Flood and Coastal Defence – A Review*. R&D Technical Report D2302/TR1 (HR Wallingford Report SR587), Crown copyright, London 2002.
  - [9] Smith, K., *Environmental Hazards: Assessing Risk and Reducing Disaster*, 2nd ed. Routledge, London/U.S.A., Canada 1996.
  - [10] Strelau, J., Zawadzki, B., *Kwestionariusz Temperamentu PTS*, Pracownia Testów Psychologicznych PTP, Warszawa 1998.
  - [11] Studenski, R., *Ryzyko i ryzykowanie*. Wydawnictwo Uniwersytetu Śląskiego, Katowice 2004.
  - [12] *Wypadki drogowe w Polsce w 2012 roku*. KGP, Warszawa 2013.

