

Psychological Factors Affecting Driving as an Important Element in the Examining and Training of Professional Drivers

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The article presents the psychological conditioning of working in the profession of a driver. Important features of the psychological tests described in the transport regulations and other aspects important for road safety are indicated. Being familiar with these conditions is necessary not only for transport psychologists but also for trainers, and drivers preparing themselves to work as professionals.

Keywords: transport psychology, drivers, road traffic, safety.

1. INTRODUCTION

Driving a car is one of the most dangerous activities we do, but it is often underestimated. The truth behind this thesis is that the profession of driver has been placed on the list of the most dangerous professions, at risk of accident, leading to loss of health, condition or even life. At the same time, many drivers are unaware of these circumstances, overestimating their driving skills and, if not primarily, their psychophysical condition, and they rarely possess sufficient knowledge.

The issues of psychological conditioning are rarely emphasized in the process of professional drivers training. It is assumed that a driver who has obtained a positive psychological opinion on the absence of any driving contraindications and / or on the driver's position has sufficient skill to safely navigate on the road. One of the conditions for obtaining driving privileges is, apart from the ability to operate the steering equipment and knowledge of traffic regulations, also physical and mental health.

In transport psychology, the most important element is mental component, so the psychological studies of drivers are primarily based on the evaluation of the way an individual operates, which may have obvious impact on safety of road traffic. According to legal considerations, personality (including temperament as a regulator

of behaviour in difficult situations), social maturity (including understanding of norms), self-control and adaptation, emotional balance and maturity, and their impact on the risk of disorganization of behaviour, are analysed.

In addition, cognitive and intellectual functions and psychomotor efficiency based on visual sensory coordination, reaction time, attention function, memory and perception processes, perception, attention, understanding and anticipation are assessed. The individual differences in each of these qualities determine a certain characteristic of individual behaviour in everyday life, influencing the characteristic, or constant response of the individual. These characteristics are explained below, taking into account their importance for safe driving.

2. PERSONALITY PREDISPOSITIONS OF DRIVING

As already mentioned, regulations of the law emphasize the need to study personality predispositions. A considerable amount of personality theories make it possible, depending on the concept created, that the fundamental dimensions of this component may be slightly different, in many of them also slightly different dimensions of the functioning of the mental unit are considered as significant. Many researchers are pondering what really has the greatest impact on

the quality of human functioning, whether it is the individual itself, or the situation in which the behaviour is being displayed or whether it is motivated by awareness or not fully aware of whether a person is determined biologically, or their behaviour is intentional, and finally whether the personality actually exists or it is only a theoretical construct created by researchers for the purpose of describing the behaviour of an individual.

According to Oleś [14] personality is the coherence of thoughts, feelings and behaviours of a person, manifested in different situations and subject to certain changes over time. Allport [16] defines it as a dynamic organization within the unit of these psychophysical systems that determine a unique adaptation to the environment [16]. On the other hand, Pervin [16] identifies personality as a complex whole of thoughts, emotions, and behaviour, giving direction and pattern (coherence) of human life. In his view, like the body, the personality consists of both structures and processes, and reflects the actions of both nature and the environment. The concept of personality in this sense also covers the temporal aspect of human functioning, because it contains memories of the past, mental representations of the present, and images and expectations of the future.

According to these definitions the psychology of personality may be described/interpreted as a science of the overall functioning of a person, pointing to motivational sources, personal development opportunities, and the risk of disorder, which may have significant consequences for the safety on roads. The cognitive aspect of explaining the causes of behaviour is highlighted as well as the practical aspect of predicting behaviour, supporting personality development, and possibly preventing pathologies. Particular attention should be paid to the personality component of temperament.

Temperament is a part of a personality that is considered inherited, genetically determined and revealing itself in the first year of human life. It constitutes the basis for the formation and development of the personality of the individual [4, 15]. Such understanding affects every sphere of human life, including driving. Nowadays in literature a number of definitions of temperament can be found, but the most comprehensive, in my opinion, is the understanding of the concept proposed by Strelau [18, 19]. In his opinion, temperament refers to: "... the basic, or temporal, qualities of personality that manifest themselves in

the formal behavioural characteristics (energy and time parameters)."

These features occur in early childhood and are common to both humans and animals. Being primarily determined by innate physiological mechanisms, temperament can also change occurring under the influence of aging and certain environmental factors. This definition contains several important consequences for the definition of temperamental traits. Temperamental qualities belong to the personality as part of its structure. Temperament is therefore neither a synonym of personality nor a completely separate structure.

The relation between temperament and character is to be understood in such a way that the first influence ontogenesis on the formation of the latter, creating a joint structure of the individual's psychical uniqueness, known as personality [29]. Temperament as a regulation system and the need for stimulation can affect individual differences in responsible driving, behaviour towards other road users, and the choice of an appropriate strategy for driving in traffic [11, 12].

3. INTELLECTUAL POTENTIAL OF THE DRIVER AND ANTICIPATION ON THE ROAD

Another important aspect is intellectual predisposition. The innate components of personality are composed of personality parts associated with both anatomic and physiological possibilities. Among them, we can distinguish the temperament described above as the set of the most permanent mental properties of man manifested in their emotional and motor reactions, but also intelligence as a general ability or ability to adapt new requirements or ability to think effectively.

Intelligence is a very broad concept, so there are many definitions of it. We can say that it is a theoretical construct relating to the relatively constant internal conditions of a human being, which determines the effectiveness of performing tasks or solving problems that typically involve human cognitive processes. These conditions result from the unit-specific interaction between genotype and environment the person is living in [18, 21]. Referring to the remaining interpretations in the literature, it can be defined as both the ability to adapt to changing conditions, ability to learn, creative thinking, information processing and problem solving, and the ability to use previous experiences and control of one's own

cognitive processes and perceptions of dependence and conclusions from their own actions.

Transport psychology is closely related to an adaptive model of intelligence, and therefore understood as a mental property manifested in a relatively constant and characteristic performance of tasks [19, 20]. Intelligence is referred to as the ability to adapt to changing environmental conditions, including the constantly changing road conditions. An intelligent human, in accordance with theoretical assumptions, will be able to use prior experience and effectively control the processes responsible for processing information to respond appropriately, knowing the consequences of his decisions. In the work of a professional driver, this ability often determines the right choice of behaviour from the existing repertoire and understanding its consequences. The ability to anticipate is directly associated with this feature. The thought process of predicting road events is extremely important for road safety.

4. COGNITIVE PROCESSES AND THEIR ROLE IN ROAD SAFETY

The next important aspect, that is a problem to psychological research are cognitive processes and their significant impact on the functioning of drivers. Among the skills and abilities necessary for safe driving are perceptual processes responsible for the way and speed of information processing. Cognitive psychology and cognition assume that the key role of the cognitive system is symbolic representation of various aspects of reality. Perceptual processes involved in information processing are involved in every human activity, including driving a car. It is certainly a highly complex operation. First and foremost, it requires the perpetrator to receive and process continuously incoming information, secondly, the readiness to react responsibly to them. The driver must be vigilant in relation to the road and its environment. Of course, it should be emphasized that the number of concurrently processed information in a human is not unlimited, so the driver should be able to selectively get the stimulus coming to him while driving. It has been shown that many accidents could be avoided if the driver's attention was directed at safety-relevant information rather than to the well-being of the driver [3].

The process of perceiving, receiving visual, auditory or sensory stimuli is the beginning of multi-step processing and synthesis of brain

information [1]. Complicated stimulus systems that reach the individual parts of the brain through the sensory organs reflect the fragments of the surrounding reality received by the experimenter at a certain point in time. This is an important aspect that should be taken into account during each activity. The driver has to process vast amounts of information within his field of vision. Perception of signs, objects, events, and people during driving requires high perceptual efficiency. Perception, on the other hand, is not merely a passive impression of the external environment, but is, in fact, the result of an active interpretation of sensory data, which is used both by contextual cues and attitudes and prior knowledge [10]. Perception usually allows accurate assessment of the situation, but under certain circumstances, such as pressure and stress, in specific social circumstances, or in case of having a psychological/emotional problems or unstable personality pattern, the assessment may be distorted.

A large group of cognitive processes are observation processes, which are a mechanism for reducing the excess of information that reaches human beings at the moment. This allows only a portion of the senses to reach sensory organs to be recognized and to be able to activate the relevant information from the memory structures and to trigger further processes to allow the appropriate response at the moment. Due to the difficulty of the task, which has to be done on road at the moment, the driver should make the attention aspects such as concentration, meta-analysis and divisibility. During a very fast highway drive, the driver uses all of his resources to control the vehicle and a small area of the road right in front of the vehicle. Slower driving "releases" part of the process so that the driver is able to control a larger part of the environment or additional activities. Among them, the ability to make an accurate assessment of speed and distance, and the speed and accuracy of the reaction are very important [9].

Another, no less important aspect, besides the perception of the stimulus is the choice of a remedy strategy, and therefore a decision on how to respond. Decision making is a complex mental process involving not only cognitive but also emotional and motivational elements. The direction of this process is influenced by the knowledge and experience of the decision maker, and contextual factors are also important [21]. Dynamic driving situations require the driver to be able to make decisions in a very limited time, often

under the influence of stress. The more surprising the situation, as well as the less experienced driver, the more time it takes for him to properly assess the situation, to take the right decision and to execute it correctly. It has been shown that these skills can be practiced using the appropriate individualized training for each person [15].

While driving a car, the person is constantly confronted with the task of evaluating the traffic situation. The driver must not only accurately assess the distance from the obstacle or possible collision, but also should respond appropriately to this situation. Adequate identification of the point at which a person reaches the obstacle and the ability to respond appropriately to the situation is considered to be one of the basic skills that the driver should have. This capability is essential not only when encountered by drivers on the road, such as standing or very slow moving vehicles. It is also needed for such manoeuvres as overtaking or crossing the road, where the driver must assess whether it is at sufficient distance from other vehicles to perform the manoeuvre.

Two main factors that influence the estimation of the distance from an obstacle or possible collision are the nature of the environment and the speed of travel. In a non-stimulating environment, drivers tend to overestimate their distance from the obstacle, which may delay the reaction. In the context of a wealth of detail, managers measure the distance from the obstacle as less than it actually is, which influences early reaction.

High speed is associated with a tendency to misjudge the distance from an obstacle and has an impact on the potential for a collision or road accident to a greater extent than at a lower speed. Under such circumstances, the decision to stop is likely to be taken too late. Mainly because at high speed and in a poorly detailed environment, the brain does not receive any distraction from the environment or does not have enough time to process it [9]. We should also notice the significant individual differences at the ability to assess distance, time divide from obstacle, and response time for of particular driver, which is also evident in driving style and behaviour.

The driver often has insufficient knowledge of the psychophysical conditions of driving, the change they make under the conditions of movement, the emotional state of the driver, the multiplicity of stimuli provided, the effects of psychoactive drugs, drugs, etc. There is also no satisfactory knowledge of their own age-related limitations temperamental features or even gender

dependence. The road participant should know that all these aspects have a great impact on the safe functioning of a professional driver. Knowing these conditions does not only mean the ability to find constraints, but also the strengths that may be the basis for compensating for possible deficiencies. It is therefore worth noting in the driver education course that the knowledge of the perceptual processes allows effective execution of the decisions taken. It is also essential to know the intellectual aspects of the situation, to make the right judgment of the situation, to make the right decisions, as well as the knowledge of temperament and personality, such as responsibility, criticism, task-solving style, emotional control, prediction, attitude, and also proper behaviour in difficult and stressful situations.

These processes should be considered in terms of age and driving experience. Other criteria should apply to a very experienced, older driver, and the 18 years old candidate who is applying for a driving license. It is necessary to remember that the above-mentioned efficiency and characteristics develop, change and degrade unevenly in each person's life.

5. OTHER ASPECTS AFFECTING DRIVER SAFETY

In addition to the variability of internal conditions, the external environment is also changing. Driving involves performing many tasks at the same time, which requirements can constantly evolve. If the driver want to drive safe, have has to stay constant vigilance, and make decisions based on ever-changing information flowing from the environment, and perform specific manoeuvres. And all this is based on knowledge of his own skills or performance. Psychic predispositions are as important as driving techniques. It is important for the driver to be aware of their strengths and weaknesses. It is important that there are also situations in which a person risks himself. In the theory of risky behaviour, attention is drawn to the fact that the ultimate behaviour of man is the result of many factors. Most often the risk is understood as a function of the size of the loss (consequence, threat) and probability of occurrence.

The tendency to risk is excessive speed, but also driven under psychoactive substances. In Poland, alcohol is the most common psychoactive drug. Its consumption is quite common, unfortunately the

quite frequent problem is also drinking and driving by car. The unruly drivers are one of the biggest threats to road safety in Poland. Driving requires the driver to have proper visual-motor coordination, because almost 90% of the stimulus input is visual information. The flow of these data alcohol disturbs the fastest and with the most intensity. Driving under the influence of psychoactive substances poses a direct threat to the driver himself, his passengers and other road users. The rate of absorption of alcohol by the blood system depends on the individual characteristics of the body, such as water content [22], age and sex [8] genetic characteristics [6], and food intake before, as well as drinking alcohol [5]. But any amount of alcohol affects the functioning of the human body more or less, and in the case of the driver, this effect is in no way beneficial.

Another aspect to be considered in the context of professional driver training is fatigue. According to data presented in the report on road safety in Poland from June this year, fatigue and drowsiness are 22.2% of all accidents. Analysis of car accidents shows that the risk of accidents reaches the highest level at 03.00 in the morning and 0.15.00 in the afternoon. The effect of mental tension resulting from situations characterized by low volatility are fatigue-like states: monotony, reduced vigilance, mental agony which makes a person unable to perform work with the same efficiency. Professional truck drivers are particularly exposed to the risk of fatigue collisions. Therefore, European legislation introduces working time limits for drivers. Research by Arnold et al. [2] in the group of 600 drivers employed in various transport companies show that about 30% of driver's experience fatigue while driving and considers fatigue as the most important problem in assessing occupational safety, while 35% of drivers consider that nothing can be done to minimize the problems of fatigue.

Tired person is a dangerous driver both for himself and other participants, because the onset of sleepiness slows down the reaction time, increases the number of mistakes made, disturbs attention and perception, causes short-term memory problems and increases the level of aggression, which causes symptoms very similar to driving under the influence of alcohol or drugs [23]. It is therefore important to prevent and educate drivers about the effects of fatigue on psychophysical health and thus on personal safety and other road users.

Driving on the road is also connected with confrontation with difficult situations caused by bad driving conditions, the behaviour of other participants, or the emotional state of the driver. The most important element affecting road safety is the psychophysical condition of the driver, which, under the influence of negative psychosocial factors causing stress, may be reduced. So, another important aspect in terms of security is stress. Contemporary approach defines stress as a specific type of relationship between resources understood as the ability of the individual and the requirements for it. The stress response in this sense consists in distorting the balance between the requirements and the possibility of meeting them [7]. The same reasoning can be taken in traffic, considered a stressful environment. The safety factor specified in this way can be illustrated as follows:

$$\text{ROAD SAFETY FACTOR} = \frac{\text{PSYCHOPHYSICAL DRIVERS CAPABILITIES}}{\text{REQUIREMENTS FOR THE DRIVER}}$$

Fig. 1. Road safety factor of road participants.

The profession of a driver is defined as one of the most difficult and stressful occupations. Every person while driving is sometimes experiencing tension, as well as negative emotions. These feelings are the result of the reaction to the various stressful situations encountered by a driver while driving. In turn, any of these situations can lead to unpredictable and dangerous behaviour of the driver on the road. It should be noted that this coefficient refers to the current capabilities of the driver (resulting from mental backgrounds such as personality, temperaments, social and emotional maturity, moderated and interrelated elements such as stress, fatigue, resistance to distractors, functional loads, etc.) and current requirements for the driver. These requirements are set by the environment, other road participants, the dynamic road situation, and a driver himself etc.. The result of this specific relationship is the behaviour of the driver and the decisions he makes. These decisions and the time needed to take them often depend on the lives and health of the road participants.

6. CONCLUSIONS

As the conclusion, it should be emphasized that the driver is one of the elements of the traffic system. Elements of this system influence each other and mutually condition one another. Knowing that the specifics of individual elements can influence a greater understanding of their variability, and consequently lead to a cautious, trust-based behaviour in traffic. Recent years have brought a lot of facilitation to drivers, both in terms of road infrastructure as well as the structural characteristics of vehicles. Changing the traffic conditions and the layout of the elements leads, on the one hand, to significant facilitation in the targeting technique itself, but also requires a far greater degree of concentration and attention due to the tracking of a multitude indicators and objects and an increase in traffic complications. Increasing vehicle safety or improving road conditions can lead to an increase in subjective sense of security and, as a result, increased tendencies to risky behaviours [13]. The training and driver education should be extended to this element as well as those described above. Knowledge of the subject as well as awareness of one's own strengths and weaknesses is one of the most important elements of road safety prophylaxis.

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