The human factor in road safety

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Abstract. Analysis of statistical data of road accidents shows that most of them are the fault of drivers, so the main and main task of motor psychology remains the study of the human factor in order to improve road safety and reduce the number of accidents.

1 Introduction

The continuous growth of the country's automobile fleet, the unsatisfactory condition of the road network, as well as significant shortcomings in the organization of traffic and ensuring the professional level and discipline of drivers and pedestrians are the main causes of road accidents.

Traffic management is an important tool for regulating traffic flows on motorways, which allows increasing the speed of vehicles and reducing traffic congestion [1].

2 Methods

The Main Directorate of Traffic Safety of the Ministry of Internal Affairs published statistics of road accidents on the roads of the republic until November 2021 (Fig. 1).

According to statistics, the most accidents were recorded in the Ferghana region – 1,469, in the Tashkent region – 1,336 and in Samarkand – 1,129. This is followed by Namangan region – 1,082, Tashkent – 1,073, Andijan region – 848, Kashkadarya region – 552, Karakalpakstan – 506, Bukhara region – 436, Surkhandarya region – 376, Khorezm region – 342, Navoi region – 329, Jizzakh region – 321 and Syrdarya region – 202 [2].

The main causes of accidents are called non-compliance with the established speed limit – 2,010 (20.1%), improper organization and malfunction of roads - 2,009 (20.1%), as well as pedestrians crossing roads in unmarked places – 1,380 (13.8%).

Pedestrians were involved in a significant part of the accidents – 4,698, of which 1,621 were children. With the participation of cyclists, 1,075 accidents occurred, and motorcyclists – 84.

2,008 accidents were committed by young drivers who were not yet 25 years old, and in 2,057 cases – up to 30 years old.

3 Results and discussion

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Analysis of statistical data of road accidents shows that most of them are the fault of drivers, so the main and main task of motor psychology remains the study of the human factor in order to improve road safety and reduce the number of accidents. Fatigue as a process and fatigue as its mental component can be investigated by measuring variables of specific driving indicators, conducting control tests on an auto-trainer. Even if it were possible to describe the entire heterogeneous totality of fatigue manifestations (for example, an involuntary decrease in movement speed, changes in the structure of visual eye movements, etc.), it is still difficult to quantify the deterioration in performance as a result. In addition, indirect signs of behavior that reduce safety may also decrease. Studies of drivers' vigilance in real and simulated conditions explain the different attitude of drivers to the danger factor in real and simulated conditions.

![Statistics of road accidents on the roads of the Republic of Uzbekistan for 2021](image)

Within the framework of motor transport psychology, road behavior began to be studied with a check of psychophysiological qualities. The identification of significant factors led to a differentiated analysis of the criteria problem, and it in turn led to a differentiated analysis of the fundamentals of behavior.

At the same time, the previously significant, at first glance, significant signs of behavior were not only revised, but their relationship with certain conditions of road behavior was also established. 103 Biographical data of drivers constantly reveal clearly expressed relationships with psychological criteria of their safe road behavior, for example: family (conflicted home environment, incomplete family, inharmonious life in the family); school (incomplete schooling, insufficient abilities, unbalanced behavior towards teachers and fellow students); professional development (frequent change of place of work, conflicts with superiors and colleagues); creating your own family (inharmonious marriage or family, financial difficulties); health (careless attitude to one's health, long-term bad habit of smoking, unrest in the service, in sports and everyday life). Safe road behavior is characterized by the absence not of road accidents, but of natural dangerous conditions and actions leading to an accident.

The criterion of the absence of accidents does not exclude the presence of danger in behavior and in traffic conditions. Thus, the absence of road accidents is not equivalent to traffic safety. For example: the driver of a vehicle cuts a corner on an unobserved left turn. This extremely dangerous and unacceptable action in traffic conditions most often does not give a high accident rate either for this section or for the driver. The driver has to perform a large number of actions to control the car, some of which turn out to be erroneous. So, in
conditions of heavy traffic in the city during the working shift (7-8 hours), drivers of shuttle buses or taxi cars perform about 5.5 thousand operations for driving a vehicle. At the same time, about 20% of these actions are erroneous due to lack of time for receiving and processing information. Drivers experience a particularly large shortage of time when dangerous situations suddenly arise, when delay or failure to perform the necessary actions can lead to an accident [3].

The concept of "driver reliability" can be defined in different ways. In engineering psychology, the definition of this concept is based on the reliability of a human operator. Psychologists understand this as the ability to accurately drive a car. At the same time, the main factors determining reliability are considered to be the driver's suitability to drive a car, preparedness and efficiency. These factors always interact with each other and are the main ones in assessing the professional qualities of a car driver. Given that the VADS system is an interconnected whole and its reliability or failure is due to all its elements, it is possible to determine the reliability of the driver in a slightly different way. At the same time, a uniform approach is needed to assess the reliability of the car and the driver. Less information about the reliability of the driver has been accumulated than information about the reliability of the car, in rare cases, the actual data are summarized. Quantifying the reliability of the driver is a difficult task, since the modeling of the driver's control properties is accompanied by a number of assumptions and reservations and is still possible only for special cases. This means that the reliability of the driver is the property of maintaining the parameters of functioning within the limits that ensure traffic safety, appropriate driving modes and conditions of use of the car. Driver reliability is a complex property defined by simpler properties, such as reliability, recoverability, persistence, durability. Let's look at them in more detail. Psychological reliability of drivers is the compliance of their psychological qualities with the requirements of driving activity. Psychological reliability depends on the characteristics of these qualities, which include sensation and attention, speed and accuracy of sensorimotor reactions, attention, thinking and memory, emotions and will, as well as moral qualities, abilities and interests, temperament and character.

It is known that a greater percentage of accidents occur due to the fault of the driver, whose reliability is determined by a complex of interrelated biomedical and psychophysiological factors. One of the main places in this complex is occupied by the level of efficiency of the driver. Driving work is one of the most difficult both physically and psychologically. In accordance with the accepted classification, physical and mental works are distinguished. Physical work can be dynamic and static. Mental work comes in the form of mental stress (attention strain, thinking processes) and in the form of emotional stress [3].

A driver's mistake can threaten the health and life of both the driver and other people, therefore, the requirements for his performance must be very high.

The homeostatic level of basic human functions under the influence of a complex of disturbing factors is maintained by moving to a new level of regulation by using reserve capabilities, involving new and excluding other parts of the system. The limitation of these adaptation mechanisms leads to an increasing drop in the adaptive capabilities of the system and, as a consequence, to a decrease in the reliability of the driver in the process of driving. The mobilization of the functional capabilities of the body provides the necessary reliability of the driver for a certain time, which misleads some researchers who believe that fatigue from prolonged driving is not an essential factor requiring research. As the main features characterizing the driver's performance, the following are distinguished: the adequacy of the response to the disturbing effect; the duration of maintaining the homeostatic level of the main functions with minimal energy costs in the process of activity; the time it takes to reach the level necessary to perform a given activity and restore it to its original level after the termination of this work. Therefore, efficiency is the ability of a person to maintain a given
level of activity at the lowest cost in order to achieve a goal or solve a task. The change in working capacity is largely due to the increase in fatigue, which is a consequence of any production activity, and the energy consumption associated with this activity.

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- the time it takes to reach the level necessary to perform a given activity and restore it to its original level after the termination of this work. The analysis of road traffic accidents in general shows that most often road traffic accidents are committed due to the negligence of drivers and pedestrians, which, in turn, leads to disrespect of citizens to the requirements of the legislation of the Republic of Uzbekistan [4].

4 Conclusion

The legislation "Rules of the road" characterizes the level of protection of road safety from road accidents and their consequences. A traffic accident is classified as an event caused by the death of people or the receipt of various bodily injuries, damage to vehicles, structures or material damage to property as a result of the movement of a vehicle on the road or with its participation.

Road safety is a huge set of measures that ensure the safety of all road users. We have with you, without exception, a direct relationship to the category of "Road users" as passengers of vehicles and, finally, drivers of such vehicles as pedestrians [4].

According to the complex "driver – car – road – environment" from the point of view of reliability, two series of patterns can be distinguished: one series is due to the technical capability and readiness to work of the car, the road and all means providing this work, and the second is determined by the socio-biological characteristics of the driver, who is the central link of the system, and his readiness to implementation of the work program [5-10].

In recent years, large-scale work has been carried out to improve public transportation services, expand the route network of public transport and upgrade the rolling stock fleet with modern environmentally friendly buses.

Based on new approaches with the participation of foreign experts, a new route network of public transport of the city of Tashkent has been developed.

At the same time, non-compliance with the regularity of traffic, requirements for safety and quality of transportation, lack of differentiated fares, failure to ensure the priority of public transport reduce its attractiveness.

The current system of financing public transport does not allow updating the rolling stock fleet on a systematic basis and widely attracting private investment in the industry.

In order to fully meet the needs of the population in passenger transportation of appropriate quality and comfort, to create an attractive business environment for the private sector by introducing market principles into the industry, in particular, improving the financing system and tariff policy, as well as in accordance with the Development Strategy of New Uzbekistan for 2022-2026.

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