Analysis of the traffic`s flow distribution by the types of drivers' temperament

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Abstract − This paper shows the results of the survey of determining the ratio of drivers by types of temperament in the transport flow that are necessary for further studies of driver's psychophysiology. Actuality of this issue consists in the necessity to take account of the driver's type of temperament as the main road traffic participants, which is one of the key factors of any behavior in difficult traffic situations.

Key words − traffic flow, temperament, psychophysiological indicators, driver, functional state.

I. Introduction

Every year more and more acutely appears the question of road traffic safety. Technical and operational characteristics of highways improves, the level of active and passive vehicle safety increases but still "humen factor" remains the least understood and predictable. Arises the question to research and establish appropriate patterns of driver's psychophysiological indicators changes during his operation.

II. The driver as a part of the driver - vehicle – road system

In general, the transport process is the interaction between the subsystems of the "driver - vehicle - road" system. One of the components of this system is the traffic flow. The traffic flow is a part of the subsystem "traffic conditions - traffic flows". Properly organized management of this subsystem enables to reduce costs of transportation and improve traffic safety.

The transport flow is an organized movement of vehicles by transport network [1]. Its main indicators are the intensity, speed and density. The influence of these indicators on the driver's organism was investigated by various scientists. Increase of traffic`s volume and complication of traffic conditions instantaneously display on the nervous and mental state of the driver and his emotional stress [2]. This, in its turn, affects driver behavior in various traffic situations.

One of the main indicators of the driver's organizm is its functional state. It is the level of organizm's adaptation to external stimuluses [3, 4]. The results of studies of various scientists testify that due to driver's poor functional state malfunctions may occur in the man's work, as the operator of the transport process. As the N. U. Hiulyiev says, reliability and safety of the "driver - vehicle - road" system on 70-80% dependends on the driver's actions.

One of the characteristics that greatly affects the driver's behavior during driving is his temperament [3]. Temperament is an individual innate human quality that is shown in the psychic reaction rate to other people and circumstances. By type of temperament people are divided into sanguine, choleric, melancholic and phlegmatic persons. However, its explored that most people have a combination of two or even all four types [5].

As for drivers, depending on the type of temperament, their behavior in the same road situation may be different. For example, drivers-choleric are characterized by low culture of driving, non-observance of traffic rules, tend to exceed the normalized speeds. However, they react to situations that arise unexpectedly the most quickly. The opposite is the type of phlegmatic temperament that is extremely durable in long-distance runs, but somewhat delayed reaction can be expressed poorly in a crash situation. Sanguines are different by working capacity and vigor, but get tired of the monotony, so they are not too reliable for long distances. It is believed that the least fit for driving are melancholics because they can not control their emotions very good, they are characterized by doubt, fear, confusion. This can be a cause of errors while driving and in accordance cause accidents [3].

Researchers in [6] believe that the main component of temperament is an emotionalism, and its characteristic is the quality that predominate in humans. According to this characteristic scientists in [7] found that the most suitable to the driver's activity is a man with strong nervous system, the mobility of the nervous processes, the advantage of excitation over inhibition or balance of nerve processes.

The strength of the nervous system can act as one of the decisive factors of professional success of a driver [8]. Scientists on a base of statistics of traffic accidents determined that drivers with a weak nervous system do not allow the transition of the traffic situation from complicated into critical. Drivers with a strong nervous system allow this transition overestimating their capabilities.

To determine the temperament of the driver are used various kinds of tests. Often these methods of human physiological characteristics are used in professional selecting of candidates for drivers. This is because they allow to evaluate necessary assessment quickly and objectively and establish human individual peculiarities.

The most common test to determine the human temperament is "Eysenck questionnaire". It consists in providing concrete answers "yes" or "no" to 57 asked questions. According to the answer sheet form a value of extra-introversion and neuroticism of a man under examination. On this basis builds a graphical representation of test results that provide information about a proper type of temperament of experimental subject.

III. Research of driver`s temperament

To calculate the necessary amount of respondents was used a formula that takes into account the proportion of a given sampling error and amount of general totality, namely for what quantity research results would be distributed. In [9] is indicated that if the amount of the

general totality is more than 100.000, then this value can be neglected. This is because it does not significantly affect the increase of sample volume.

An indicator that is often used in sociological research is sampling error which is 5%, so, according to formula 1 sample size is 400 people that have to be interviewed [9].

$$n = 1 / \Delta^2 \qquad (1)$$

Δ^2 – allowable error.

The survey participants were only people with valid driver's license. Graphically research results are represented in Fig. 1.
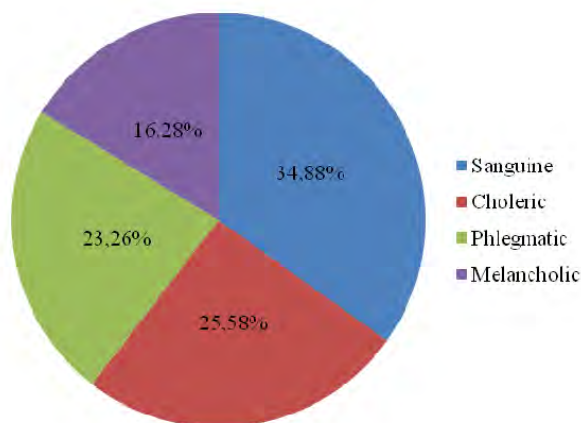

Fig. 1. Sorting of drivers by their temperament
in traffic flow

After the survey was determined that in the traffic flow the predominant type of temperament is sanguine, its share is 34.88%; the following is choleric (25.58%), than phlegmatic (23.26%) and melancholic (16.28%).

Conclusion

According to the a survey results was determined that in traffic flow dominate drivers with this type of temperament - sanguine. These data have weighty scientific value. According to these data of statistical analysis of the distribution of traffic flow by the type of driver's temperament it is necessary to form samples with an appropriate correspondence. This will allow to establish corresponding regularities more accurately on the influence of different traffic conditions on psycho-physiological indicators of drivers.

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