



Characteristics of Driver Perception of Road Elements and Road Conditions

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ABSTRACT

Measures taken in the field of road safety of the Republic of Uzbekistan, instructions and legal documents of our President Shavkat Mirziyoyev show that road safety is the most important problem of our time. On February 11, 2022, under the chairmanship of the President of the Republic of Uzbekistan, Shavkat Mirziyoev, a video selector meeting was held on measures to ensure human safety on the roads. The leader of our country emphasized that this issue has not been seriously and analytically discussed by any leader or organization in the last five years, the laws and works in this field are completely unsatisfactory, the issue of road safety has gone out of the way, and this is the reason for many people's objections[1,2].

When driving a vehicle, the driver must be aware of the information environment in order to identify warnings, awareness of them, and make appropriate decisions. The information environment includes road and road conditions, according to its perception, natural and weather-climatic conditions that reduce the road distance are analyzed.

Keywords:

road elements, perception, driver, transport, maneuver, overtaking, passing roads, road, driver psychology.

Introduction. Educational programs for training, retraining and improving the skills of motor vehicle drivers at the Academy of the Ministry of Internal Affairs of the Republic of Uzbekistan at the Department of Automotive Training in accordance with the Laws of the Republic of Uzbekistan "On Traffic Safety" and "On Education", PQ-190 of the President of the Republic of Uzbekistan dated April 4, 2022 "On measures to reliably ensure human safety on highways and drastically reduce the number of deaths" and Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated May 31, 2018 "Motor vehicles and cities No. 408 on measures to further improve the licensing procedure for the provision of non-state educational services for the training and retraining of electric vehicle drivers and the conduct of theoretical and practical exams for obtaining a driver's license granting the right to

drive motor vehicles and was developed on the basis of decisions No. 393 dated July 20, 2022 "On measures to fundamentally improve the system of training, retraining and upgrading the skills of drivers of motor vehicles and their examination".

The currently valid traffic rules Decision No. 172 of the Cabinet of Ministers of the Republic of Uzbekistan "On Approval of Traffic Rules" was approved on April 12, 2022 and came into force on May 1 of this year[3,4,5].

Scientists studied such features as the distribution of perception, the level of mental violence, and the level of activity of the central nervous system. The main reason for the research is the existing rules and methods for the design of roads and the implementation of traffic. In 1970, international organizations were formed on the perception of the road environment of drivers, whose task is to

comprehensively study the role of the human factor in ensuring road safety and take into account the environment, access to the car, the age of drivers and the reliability of their work, the influence of drugs and the actions of drivers in stressful situations.

There are several theories about presenting all the elements that affect psychological and physiological qualities in one way or another, and the road itself, the entire path, etc.. The road must be visually smooth and psychologically clear to the driver. Therefore, great attention is paid to following the principles of visualization at the design stage. Controlled by objects placed parallel to the trajectory of the driver's car, for example, curbs, various objects on the side of the road, the location of concrete pavements, etc.; these natural landmarks can be linked by man-made road signs.

While viewing natural and man-made landmarks, the user sees the car's motion as a distracting path and tends to mentally extrapolate the car's gaze along a straight or smooth curve. It continues to follow the next path on its path. On the road, the driver is given a guide, the direction of movement chosen by the driver is considered the main one.

Research methodology. Perception of road elements - the process of the driver's perception of the road condition was indirectly studied in the work of determining the safe width of the carriageway. Creating a modern methodology for calculating the width of the carriageway, which takes into account not only the type of rolling stock, but also the perception of speed and distance of drivers. The values of safety clearances when passing cars depend on a number of factors: the width of the road, the type and condition of the pavement, the air pressure in the tires, the speed of movement and, most importantly, psychological characteristics. from the drivers.

The road must meet the requirements of safety, durability and stability under the influence of traffic flows and weather and climate conditions. It should be noted that depending on the degree of change in the speed

of movement, the ways of influencing the road on the driver through inter-element connections, which increase its reliability, change. It is customary to consider sections with conflict zones, unsuccessful combinations of route elements or unfavorable traffic conditions affecting a sudden change in traffic mode as difficult.

Depending on the severity of the driver's driving actions and consequences, all action elements can be divided into 4 classes:

1. Traffic flow (free flow, maximum vehicle speed) whose density determines the need for maneuvers, overtaking, passing lanes, etc.

2. Route of the road, including plan elements (section length, curve elements in the plan; sight distance, etc.), longitudinal and transverse profile of the road.

3. Elements of road regulation: technical means of traffic control (signs, signs, barriers, lighting, traffic lights and automatic traffic control); intersection and junction; bus stops; places of rest; protective structures; artificial structures; elements of architectural and artistic design of roads, traffic recording points, weight control, etc.

4. Elements of perspective and landscape, taking into account the joint connection in space of all the elements of the above classes.

According to the duration of the impact on the driver's psychological state, the elements are divided into short-term (class 3), long-term (class 2 and 4) and variable (class 1) effects.

Free flow (capacity 20%) transport is carried out without the interaction of cars, because their number on the road is relatively small and its capacity is minimal. Here is the car's top speed and possible common driver mistakes associated with it:

- exceeding the permissible speed according to the conditions of the database - loss of control;

- inconsistency of the driver's attention to traffic conditions.

As a result, characteristic failures occur:

- overturning of the car as a result of increasing the speed;
- collision with an obstacle;
- leaving the road;
- a side effect in overtaking;
- a collision with an oncoming vehicle;
- hitting the car in front.

With increased traffic, the impact of other vehicles moving in the same direction, as well as the probability of oncoming vehicles, increases, forcing the driver to pay attention. The increasing intensity of traffic requires maneuvering, especially when overtaking. With free movement, when the area necessary for maneuver is free, it is possible to pass without waiting for the right moment.

When driving at a comfortable level (20-45% road capacity), the waiting time for overtaking increases. Groups of two or three or more cars gather behind a slowly moving car. After passing, a section with free movement mode will appear. Difficulties with overtaking change the composition of failures, resulting in accidents caused primarily by improper overtaking. A further increase in flux density almost eliminates overtaking.

The transition to the comfort level (70-100% throughput) is accompanied by a decrease in the dense current, which is sometimes called saturation. The number of accidents is increasing, and the main type of them is a collision with a car in front. In the future, the comfort level (capacity 46-70%) will be intermittent. Intermittent stops cause traffic jams, and gradually the most serious failure occurs - the average speed of the traffic flow and the permeability of the road decreases [6,7,8,9].

In the perception of information, the driver's emotional perception depends on two factors: the value and quantity of information. While driving on the road, the driver's emotional perception varies in a very wide range. The accuracy and reliability of the driver's work depends on the time he spends in various emotional stress situations. On two-lane roads, we often consider driver overload, and on highways - traffic monotony and information overload.

Attracting the researcher's attention. The path of perceptual objects includes objects whose locations can be recorded during all movements: approaching and passing cars, road openings, signs and pedestrians. In the intensity of movement, the main objects that attract the driver's attention are the elements.

The main requirements for the study of the emotional tension of the driver and the objective level of confidence:

1. The route of the road and the entire traffic situation should begin to change.
2. It is necessary to rule out the possibility of the road itself being monotonous and excessively stressful traffic conditions. The first is read by familiarizing the elements of the route and the entire road with the landscape, and the second is the assessment of higher education.

Results of research and discussion. From a psychological point of view, road safety is mainly determined by the ability to help the driver to anticipate the development of road conditions, to provide him with the necessary advanced information. For example, a "sharp turn" is warned by a road sign, and "optical" is confirmed. The guiding elements of the road do not prohibit, but help to make the right choice of quick, ultimately correct actions, reduce the range of possible differences in the subjective interpretation of the conditions of movement. Thus, the corresponding road signs and guide barriers corresponding to the vehicle contain more useful accurate information that can be used not only for prediction, but also for direct control of the vehicle.

The inscriptions on the signs are intended to inform the driver about the distances to any point or about possible changes in his goal and direction of movement, so the visibility of all the inscriptions on the sign must be ensured from a distance. which, while reading, the character does not go beyond the limits of the driver's concentration field. The size of the font and the position of the pointer in the driver's field of vision should also be

considered. In order to exclude the impact of road conditions on traffic flow modes, kilometer posts, signs, route indicator boards, fences, barriers should be installed outside the impact zone at a distance of 4 m from the driver, i.e. not closer than 2.8 m from the edge of the carriageway.

One of the most dangerous sections of roads and streets are intersections, where, according to statistics, up to 25% of accidents occur. To improve traffic safety at intersections, the visibility zone is usually cleared and road signs are installed. At the same time, the size of the field of vision is determined by the length of the braking distances of cars, multiplied by the length of the road during the driver's reaction time. The latter depends on the complexity of the road conditions and the speed of the vehicle [9,10,11,12,13].

Psychophysiological conditions of the driver in severe conditions. Driving a car in difficult weather and road conditions requires increased attention from the driver, as well as the acquisition of relevant knowledge and skills to ensure traffic safety. The complexity of management depends on two factors:

1. Due to the additional load on the driver's senses, especially on vision.
2. With a change in road conditions with a decrease in the grip qualities of the road surface.

When driving for a long time in difficult conditions, the driver experiences additional physical and mental stress. As a flexibly controlled individual threshold between loading and overload, a limited time to maintain working capacity is proposed.

With long-term loads, the driver has various functional reserves of more than 100% of the total indicator, which allows to ensure the reliability of the body. Automation allows to increase efficiency by 40%; physiological functional training - by 50%; working reserve - by 80%; autonomous reserve - by 80%. In most cases, the use of these reserves occurs regardless of the driver's wishes.

Conclusions. In short, the driver needs to be aware of the elements of the road, the

perception of the road situation, the safe location of the roads from the psychological point of view, the anticipation of the development of the road conditions, the psychophysiological readiness in difficult conditions, and the correct assessment of the situation at the intersections, one of the most dangerous sections.

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