Improved psycho-diagnosis of driving related abilities

General

More than 3.000 people are killed on UK roads each year. There are two main targets of traffic psychologists: To increase the road-safety and to reduce the costs for national economy resulting from accidents. The Human-Factor in driving is the weak-spot rather than the Technical Influence. Therefore it is necessary to reflect the abilities drivers must have to be safe road-users. Most of the information necessary for driving is provided by the visual sense although other factors such as memory and motor-skills play an important role as well. Unfortunately many of the psychological tests used in traffic psychology today do not reflect the modern standard of computer-aided-psychological diagnosis. There are a lot of recent studies that show the inadequacy of some testing-methods such as the well known and widely used Snellen charts (these are the typical charts with numbers and letters to read standing a few meters away) (see Currie et al., 2000). Many authors claim the unsophisticated methods that are used to assess the visual field. Westlake (2000) writes that better tests should be developed to help determine the driving ability and that when modern methods are used to examine the visual field severe binocular field loss ist associated with a 100% increase in crash rates.

Arguments why to use the Vienna Test System

The Vienna-Test-System is a powerful tool that enables the user to administer modern and highly accepted psychological tests and – a feature that is very important within the field of Traffic Psychology – provides the ability to measure new test dimensions not recordable by standard paper-pencil tests. An example for a task which can be measured adequately only by computer-aided-instruments is the peripheral perception.

Tests

<u>Peripheral Perception</u>

The important role of the peripheral visual field in driving is evident. There are a number of studies that show the relation of loss in peripheral fields and a higher accident rate (see Szlyk et al., 1992 or Johnson and Keltner, 1983; the latter report that drivers with binocular field loss had accidents and conviction rates twice as high as those for drivers with normal fields). Another studies (Troutbeck, 1992; Wood et al., 1993) showed also that the driving performance gets worse if the visual field is restricted experimentally. Peripheral Perception is closely related to the drivers ability of speed-estimation and the detection of objects and events appearing/happening marginally. In general about 90% of the information reaches the driver via his optical channel.

The Test “Peripherical Perception” measures the visual field, visual angle (left and right), tracking-deviation, number of hints (left and right) and number of false reactions (see figure 1). It is not just a standard computer-test but has an additional equipment which allows to measure these variables very adequately. With the UFOV you can`t do that this way because the complex apparatus and the concept of the “Peripheral Perception” is much mor elaborated. For example the apparatus includes a device that measures the head-to-monitor distance with ultrasonic. Therefore there visual field can be measured extremely reliable.

Fig.1: Apparatus to measure peripheral perception with the Vienna Test System

Another important factors for driving are reaction time, concentration and reactive stress tolerance. Reaction time can be measured by the "Reaction Test", concentration by the "Cognitrone", and a test used to measure stress tolerance is the "Vienna Determination Test".

Reaction Test

The Median of the reaction time (time between stimulus presentation and letting go of the rest Button) and motor time (time between letting go of the rest button and pressing the reaction button after a stimulus has been presented) as well as the number of correct and incorrect reactions are collected. According to a study of Cale (1992) the results of the reaction showed significant correlations to the frequency of accidents.

Cognitrone

The subject has to compare an abstract figure with a sample and to make a judgment with respect to identity. The variable „Mean time correct rejections", expressing a subject's work tempo, provides an adequate indicator for the degree of concentration performance. According to a study by Karner (2000) the Cognitrone showed significant differences between drivers with increased alcohol-related risk and the norm group of Cognitrone.

Vienna Determination Test

The Determination Test requires, as cognitive partial performances, to discriminate colors and acoustic signals, to memorize the relevant characteristics of stimulus configurations and response buttons as well as the assignment rules, and to select the relevant reactions according to the assignment rules laid down in the instructions and/or learned during the course of the test. The main variable is "Correct reactions" which measures the performance ability of the

subject during longer sequences of simple reaction tasks, under pressure of answering quickly and adequately. Additionally the Determination Test has an adaptive mode, that means the presentation speed adjusts to the performance level of the subject. An initial report of a study by Karner & Neuwirth showed highly significant correlations between the results of the DT and a driving test. It was further shown that on the DT, persons who achieved a percentile rank < 33 did significantly worse on a psychologist`s driving test.

Literature:

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