Comparison of three systems for psychotechnical assessment used in Turkey

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ABSTRACT

The aim of this study was to compare three different psychotechnical test batteries in Turkey (Act and React Test system – ART2020, TRAFIKENT, and Vienna Test System) which are used to evaluate safe driving-related ability traits and to evaluate the construct validity of the tests included in these three test systems that claim to measure the same cognitive structures. Therefore, 176 drivers (19–63 years old), who owned a driving license for at least one year and had driven at least 5000 km, were tested in all three systems. Both professional and amateur drivers as well as drivers whose licenses were detained due to speeding, DWI or other violations were included in order to form a heterogeneous and representative sample for the Turkish driver population. Participants completed the three psychotechnical batteries which tested their cognitive and psychomotor skills in a period of two or three days. The analysis of the findings revealed that the three batteries were more compatible for some cognitive abilities whereas they were less compatible for other abilities. For instance, there were higher similarities among the systems in skills such as reasoning, visual memory, and attention, while there were lower similarities in terms of reaction speed, visual continuity, coordination, speed distance estimation, and visual field. The results were discussed and evaluated so as to improve traffic safety in Turkey, and further suggestions for enhancement in traffic situations followed.

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1. Introduction

The researchers who investigate the role of human factors in traffic safety have distinguished driving skills and driving style (Elander, West, & French, 1993; Naatanen & Summala, 1976). Driving skills comprise cognitive and psychomotor abilities that are necessary to drive, driving style refers to the way a person prefers or habitually drives the car. In the traffic psychology theories and models (e.g. Huguenin, 1988; Rasmussen, 1987) driving skills and styles are considered as indicators of driving safety. Driving skills are assessed by psychotechnical test batteries.

Psychotechnical assessment is a standardized test battery widely used in many countries for measuring drivers' cognitive and psychomotor abilities and skills such as perception, attention, reasoning, reaction speed and coordination respectively by using sensitive, standard and objective test systems in accordance with the psychotechnical criteria. By employing computer assisted methods, psychotechnical assessment aims at distinguishing between those who possess safe driving-related ability traits and those who do not.

Psychotechnical methods were first used to select tank operators, pilots and machinists during World War I as of 1920s, these methods were also in use to select drivers and machinists in countries like France, Finland, Romania and Spain

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(Barjonet & Tortosa, 1997). Since then, rapid technological developments triggered immense changes in psychotechnical assessment. For instance, in Austria and Germany, computer assisted test systems have been developed for psychotechnical assessment and therefore the application, evaluation and interpretation of tests have been made quite standard and objective thus minimizing testing errors. Today, not only professional drivers but also offenders are obliged to pass psychotechnical assessment in countries like Austria, Germany, Portugal, Italy and Turkey (Yasak, 2002). Participants' test results obtained from psychotechnical assessments are compared with norm groups in terms of age, gender and education. As such, drivers with relevant driving competence are distinguished from the incompetent ones. Psychotechnical assessment aims at finding out whether drivers possess necessary driving skills and increasing their awareness of their own driving skills and attitudes. In addition, it also intends to establish traffic safety by protecting road users from risky drivers, by decreasing traffic accidents and consequently by implementing a traffic friendly environment and improving the driving culture in society.

In 1996, the psychotechnical assessment was taken into the agenda of Turkey on the legal basis with the amendment in the Highway Traffic Law (HTL) numbered 2918. With this legal regulation passing psychotechnical assessment and a psychiatric examination became mandatory for drivers, whose driving license was impounded because of overspeeding, drunk driving and reaching 100 drivers' penalty points, in order to get their licenses back. Another arrangement in the Highway Transportation Regulation followed in 2003 declaring that those who will work as professional drivers are required to go through psychotechnic assessment every 5 years. Up to this date more than 22.000 drivers have been referred to this assessment.

Upon these legal arrangements, test systems for psychotechnical assessments (VTS, ART2020, TRAFİKENT) started to be used in Turkey following norm studies. Tests included in VTS, ART2020 and TRAFİKENT mainly measure skills and abilities such as reaction speed, coordination, attention and concentration, reasoning, visual field, visual pursuit, visual perception, speed distance estimation by using different subtests. Test results are interpreted in terms of percentile ranks. The percentile rank indicates what percentage of a particular comparison group achieved the same or a lower score on the ability or personality characteristic in question. A percentile rank of 16 or less indicates a below-average (2 SD) level of the ability in question in comparison with there presentative norm sample. However, all systems have different criteria for assessing fitness to drive. For example, while fitness to drive is assessed according to the number of parameters passed (over 16th percentile) in the Trafikent system; in the others, it is evaluated by considering achievement in some basic tests and the percentile average obtained from the parameters in some multi-parameter tests.

In addition, it is noticeable that there are a limited number of studies comparing these tests in order to evaluate the construct validity of the systems. A validity study carried out by Karner and Biehl (2000) using VTS and ART2020 tests, reported high correlations among tests measuring the fields of reaction speed (DT – RST3), visual pursuit (LVT – LL5), attention (COG – Q1) and visual memory (TAVTMB – TT15) (qtd. in Schuhfried G.m.b.H., 2012).

However, there is no study comparing TRAFİKENT with VTS or ART2020. Moreover, no findings are available showing whether the tests in the systems are equivalent to each other in terms of evaluating the related area of ability and levels of difficulty. Whether the three systems evaluate similar abilities and skills is also a major issue that preoccupied authorities of the Ministry of Health, Turkish National Police and Turkish Psychologists Association. Both theoretical and practical importance of the issue has been discussed in effort to solve the problem. Therefore, a research project, supported by The Scientific and Technological Research Council of Turkey (TUBITAK), which aimed to study the validity of the three testing systems used in Turkey was carried out by the authors (Amado, Koyuncu & Kaça, 2013). The first objective of the project was to investigate the degree of similarity of these three systems in terms of the structures they measure. In order to make such a comparison, drivers were asked to take the three different psychotechnical test systems. The driving behavior, attitudes and personal characteristics of the drivers were examined by self-assessment scales. The second objective was to investigate the criterion validity of psychotechnical assessment and for this purpose the drivers' behavior on actual on-road driving was observed and evaluated by professional driving instructors. In order to represent the profile of Turkish drivers, the sample group of the study included a wide range of drivers; professional/amateur drives of ages 19–63, and those with suspended driving licenses (due to alcohol, speeding or penalty points). In the light of the findings of the above mentioned project, the current article focuses on the first objective, on the questions related to the equivalence of the three test systems. Accordingly, the primary purpose of this paper is to evaluate the construct validity of the tests included in these three systems that claim to measure the same cognitive structures. The study also attempts to investigate whether it is possible for the same person to pass one test system while failing another. Therefore, drivers who pass and fail each system will be determined according to the norm values already used for the three psychotechnical test systems, and afterward the systems will be compared in terms of the drivers' passing/failing ratios.

2. Material and methods

2.1. Sample

202 drivers participated in the study and 176 of them completed all tests. 22 of the participants were not included in the analyses as they left the study before completing all the tests and another four of them were excluded as some of their scales were incomplete.