

What Do Driving Aptitude Test Results Tell about Drink-Drive Offenders?¹⁾

Kazuko OKAMURA* and
Tatsuro MITSUI*

Results of driving aptitude test were compared between male drink-drive offenders and a comparison group. The purpose was to investigate how test scores distinguish drink-drive offenders from a comparison group. Results showed that the test results contributed modestly to separating the two groups. However, difficulties in interpreting the differences raised questions about the content and face validity of the test as an educational tool for drink-drive offenders.

key words: driving aptitude test, validity, discriminant analysis

Introduction

The focus of this study is the use of driving aptitude test *Type 73-2* (Test 73-2) for drink-drive (DD) offender education. Test 73-2 is a paper-and-pencil type psychological test and has been used in offender re-education courses since the 1970s. It comprises of non-verbal performance tasks (6 subtests), and a personality test (6 scales) (Ohtsuka et al., 1976). The former resembles that of intelligent test in its inclusion of math calculation and figure discernment, but is distinctive in its inclusion of monotonous tasks such as drawing as many small triangles as possible. Sum of each subtest score is calculated and an overall test result is presented in the relative 5-level grade form. Despite its naming, it is not used for driver selection, but for educational purpose by giving offenders opportunities to reflect on their weaknesses that might affect their driving performance and attitudes. To validate the use of such a test for offender education, the test should be able to give reasonable explanation on the relationship between test scores of each subtest and the problematic behavior on the road (Matsuura, 2000). It is also required that the test differentiate offenders from non-offenders. In this study we attempt to answer following questions: how well does Test 73-2 separate DD offenders from other drivers? How can we interpret the difference?

Method

Design. Results of Test 73-2 were compared between male DD offenders whose driving licenses have been suspended ($n=159$) and a male comparison group ($n=196$). Discriminant analysis (DA) was applied for this purpose. The selection criterion for the comparison group was to have a valid driving license.

Preliminary data inspection. Cases with missing data and outliers were removed (8 cases). Independent variables considered for DA and its correlation matrix are listed in Table 1. Predictors 1 and 5 were newly created for this study. We judged use of these variables is justified based on the factor analysis conducted in a previous study (Sato, Okamura, & Nishida, 2007). Before conducting DA, a multivariate analysis of covariance (MANCOVA) was performed, with 12 subtest variables serving as dependent variables, participant membership (DD offenders or not) serving as the grouping variable, and age serving as a covariate. The result was significant (Wilks's $\lambda=.81$, $F(12, 330)=6.59$, $p<.000$, $\eta^2=.19$), indicating that between-group mean differences did exist. However, MANCOVA does not provide classification function, therefore DA was performed.

Discriminant analysis. Dependent variable in DA was participant membership (DD offenders or the comparison group). All the 13 independent variables listed in Table 1 were used to examine if the whole set of 12 subtest variables were useful in predicting a group membership. Age was included in the analysis due to its function as a covariate as indicated in MANCOVA.

Results

Table 2 summarizes results of the DA. Standardized discriminant function coefficients indicate relative strength of the predictors in separating DD offenders and the comparison group. Predictors 6 (triangle drawing), 8 (Nervousness) and 5 (Hiragana distinction) appeared to be the most important predictors. When compared to the comparison group, DD offenders drew fewer triangles, showed less tendency for nervousness, and made fewer errors in the task of distinguishing Hiragana. Centroids were $-.56$ for DD offenders and $.46$ for the comparison group. In all, 70.3% of the predicted cases was correctly classified into the actual membership (70.1% of DD offenders and 70.5% of the comparison), indicating a modest adequacy of classification. Stepwise DA was additionally performed, and this result supported the above-mentioned DA result regarding the relative strength of the 13 predictors.

Discussion

Test 73-2 results did contribute to separating DD offenders and the comparison group, but interpretation of the group difference is by no means straightforward. For example, how can we interpret the fact that DD

¹⁾ This study was supported by KAKENHI Grant (18730428).

* Department of Traffic Science, National Research Institute of Police Science

Table 1 Correlation matrix for 13 predictor variables ($N=347$)

Predictor variable	2	3	4	5	6	7	8	9	10	11	12	13
1. Figure distinction I: % incorrect	-.19***	-.32***	-.15**	.15**	-.27***	-.02	-.18**	-.04	-.06	.02	-.07	.18**
2. Line drawing		.47***	.32***	-.07	.72***	.16**	.02	.06	-.02	-.05	.01	-.29***
3. Figure distinction II			.50***	-.13*	.53***	.26***	.05	-.03	-.02	.02	-.02	-.58***
4. Mathematics—subtraction				-.12*	.44***	.19***	-.01	.04	.03	-.01	.02	-.27***
5. Hiragana distinction: % incorrect					-.10	.02	-.03	-.07	-.09	.02	-.10	.00
6. Triangle drawing						.16**	.05	.08	-.01	-.01	.01	-.36***
7. Personality: Lie scale							-.39***	-.31***	-.31***	-.44***	-.26***	-.17**
8. Personality: Nervousness								.56***	.29***	.35***	.29***	.03
9. Personality: Depression									.24***	.25***	.35***	.16**
10. Personality: Hypomania										.41***	.35***	.04
11. Personality: Aggressiveness											.49***	.05
12. Personality: Lack of cooperativeness												.11*
13. Age												

Note. Except for predictors 1 and 5 (incorrect %), raw scores are used for correlation calculation. Except for predictors 1 and 5, higher score denotes better result. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 2 Results of discriminant function analysis

Predictor variable	Standardized discriminant function coefficient	Univariate $F(1,345)$	Group	
			DD offenders ($n=157$) $M(SD)$	Comparison ($n=190$) $M(SD)$
1. Figure distinction I	-.05	1.9	19.0 (14.0)	16.7 (12.5)
2. Line drawing	-.09	19.5	61.7 (20.6)	70.4 (18.6)
3. Figure distinction II	.34	25.7	15.5 (4.4)	17.6 (3.8)
4. Mathematics	.36	29.2	13.6 (5.7)	17.1 (6.6)
5. Hiragana distinction	.43	5.6	2.7 (3.0)	4.3 (7.1)
6. Triangle drawing	.64	43.0	39.3 (9.3)	45.8 (9.5)
7. Lie scale	-.19	3.4	11.4 (3.1)	11.7 (3.1)
8. Nervousness	-.45	7.6	9.3 (4.3)	7.9 (4.4)
9. Depression	.06	1.3	11.7 (3.9)	11.1 (4.5)
10. Hypomania	-.16	4.0	10.8 (3.5)	10.1 (3.6)
11. Aggressiveness	.11	0.5	9.8 (3.9)	9.6 (4.1)
12. Lack of cooperativeness	-.18	4.0	11.0 (3.9)	10.3 (3.2)
13. Age	.17	7.0	44.5 (13.6)	41.1 (13.3)

Note. Wilks's lambda = .79, $p < .000$, Canonical correlation = .46, Eigenvalue = .26; Predictors 1 & 5 denote incorrect % of each task.

offenders drew fewer triangles within designated time? It may be due to the lack of motivation, or their slower and steady nature in the maneuver. Moreover, DD offenders scored better than the comparison group in some predictors. This leaves only too many interpretation possibilities. At least it does not provide reasonable and logical explanation on the very reason why DD offenders drove under the influence of alcohol. Results of this study suggest that content and face validity of using Test 73-2 for DD offenders may not be justified.

References

- Matsuura, T. 2000 Accident proneness and driving aptitude. In Renge, K. (Ed), *Social psychology in traffic behavior*. Kyoto: Kitaohjishobo. pp. 18-26 (in

Japanese).

- Ohtsuka, H., Suzuki, S., Isobe, H., Kainuma, Y., Yamaguchi, T., Nakajima, S. 1976 A trial to prepare driving aptitude test batteries (IV)—Development of Type 73 test battery. *Reports of the National Research Institute of Police Science (NRIPS). Research on Traffic Safety & Regulation*, 17, 50-62 (in Japanese).
- Sato, K., Okamura, K. & Nishida, Y. 2007 Factor structure of the driving aptitude test battery Type 73 and a comparison of the test results between the years 1973 and 2005. *Reports of NRIPS*, 58, 37-48 (in Japanese).

(Received: 2008. 10. 21, accepted: 2009. 3. 20)