



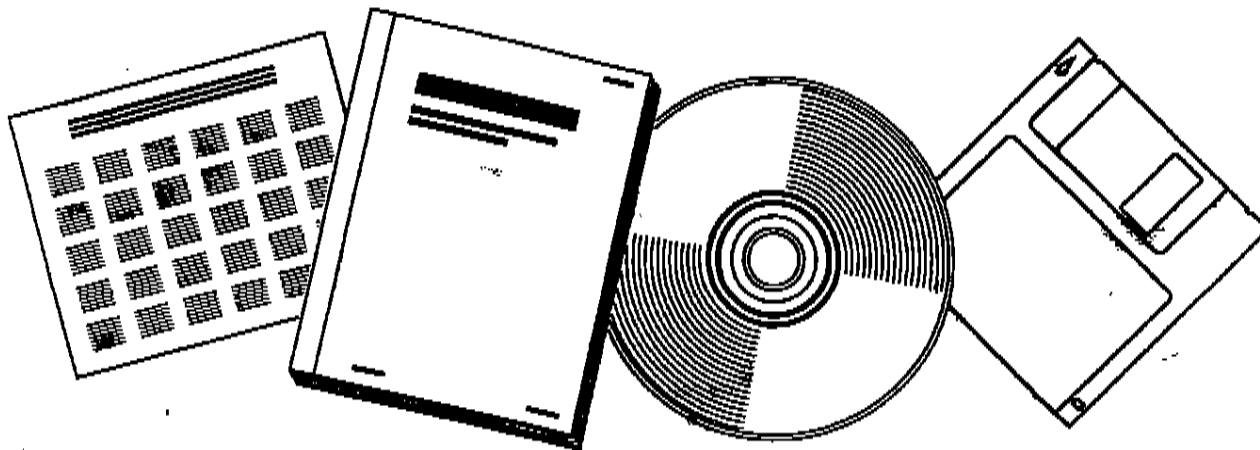
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FIELD EVALUATION OF A BEHAVIORAL TEST BATTERY FOR DWI (DRIVING WHILE INTOXICATED)

U.S. NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
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Field Evaluation of a Behavioral Test Battery for DWI

Research and Development

Office of Driver and Pedestrian Research
Problem-Behavior Research Division

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This paper presents initial findings from a recently conducted field evaluation of a sobriety test battery. Police officers from four jurisdictions were trained in the use of the sobriety test battery. They then administered the battery to drivers stopped for suspicion of Driving While Intoxicated (DWI) during the three month test period. The results indicate that the test battery can be easily administered in the field and is effective in determining whether a driver's Breath Alcohol Concentration (BAC) is above or below .10%.

KEYWORDS: *Motor vehicle operators, *Alcoholism.

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-2-

Every State in the country has either a "presumptive" or "illegal per se" law that makes reference to a BAC level, typically 0.10%. As a result, police officers have found it difficult to get a conviction for a driver whose BAC is less than 0.10%, or sometimes even close to it (unless other behavioral evidence is strong). The low level of detection and arrest of drivers with BACs only slightly above 0.10% may be the result of the lack of effectiveness of the techniques used by the officer in the field, who must make the initial determination regarding the driver's impairment level.

During a typical DWI investigation, the police officer who has formed an initial suspicion that a driver is impaired by alcohol, will sometimes administer a series of behavioral tests to the driver. These tests serve to confirm the initial suspicion and may provide probable cause to arrest the driver for DWI. Also, the driver's performance on these behavioral tests is sometimes a critical part of the evidence presented in court to support the DWI charge. At present, the tests and procedures used vary between local agencies and officers. For many of these tests, the relationship between performance and specific BAC levels has not been well documented. Thus, the National Highway Traffic Safety Administration (NHTSA) undertook a program to develop a behavioral test battery that is empirically related to BAC level and that will assist police officers to discriminate BAC levels more effectively.

An initial study² reviewed various tests that were or could be used for this purpose. Six tests were evaluated in a laboratory study. Three were recommended for development as a test battery that could be administered by police officers at the roadside. A second study³ standardized the procedures for administering and scoring each test and collected data on their effectiveness in a controlled setting. The three tests are:

1. One Leg Stand. This test requires that the subject stand on one leg for approximately 30 seconds. The time requirement is important, because it makes the test sensitive to drivers with BACs in the 0.10% to 0.15% range, who may pass the test if they only have to balance for 10 to 20 seconds.
2. Walk and Turn. This is given in two parts. The first part requires that the subject balance heel-to-toe while listening to the instructions. In other words, the subject must do two things at once - balance heel-to-toe and listen to the instructions. Doing two things at once is very difficult for an intoxicated person. The second part of the test requires that the subject take nine heel-to-toe steps long a line, turn around, and take nine heel-to-toe steps back.
3. Gaze Nystagmus. Nystagmus means a jerking of the eyes. Gaze nystagmus refers to a jerking of the eyes as they gaze to the side. Many people will exhibit some nystagmus, or jerking, as their eyes track to the extreme side. However, as people become more intoxicated, the onset of the nystagmus, or jerking, occurs after fewer degrees of lateral deviation, and the jerking at more extreme angles becomes more distinct.

-4-

Various scoring procedures were examined that combined the results of the three sobriety tests. The procedure that was best able to classify the laboratory subjects with respect to their BAC levels was one that combined the Gaze Nystagmus and Walk and Turn test scores. A table was developed for use with this procedure that contains Walk and Turn test scores as row entries and Gaze Nystagmus test scores as column entries (see Figure I). Some of the boxes in the table are darkened. If the box at the intersection of a subject's Gaze Nystagmus and Walk and Turn test scores is darkened, then the subject's BAC is predicted to be at least 0.10%.

FIGURE I

Combined Test Scoring Procedure

| | | GAZE NYSTAGMUS TEST SCORE | | | | | | | |
|------------------------|---|---------------------------|---|---|---|---|---|---|--|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | |
| WALK & TURN TEST SCORE | 0 | | | | | | | | |
| | 1 | | | | | | | | |
| | 2 | | | | | | | | |
| | 3 | | | | | | | | |
| | 4 | | | | | | | | |
| | 5 | | | | | | | | |
| | 6 | | | | | | | | |
| | 7 | | | | | | | | |
| | 8 | | | | | | | | |
| | 9 | | | | | | | | |

Using this procedure with the laboratory data, and an estimate of the BAC distributions expected for persons stopped by police officers, the expected accuracy of correctly classifying subjects as above or below .10% was 80%.

Individual cutoff scores were identified for each test, if it was the only one used, so as to maximize correct classification above or below .10%. The scores and estimated accuracy for the population expected to be encountered in the field are as follows:

- * Gaze Nystagmus - (Expected Accuracy - 77 percent) - If the test score is greater than 3, classify the subject as having a BAC above 0.10%.
- * Walk and Turn - (Expected Accuracy - 68 percent) - If the test score is greater than 1, classify the subject as having a BAC above 0.10%.
- * One Leg Stand - (Expected Accuracy - 65 percent) - If the test score is greater than 1, classify the subject as having a BAC above 0.10%.

-6-

- * Date of suspected DWI stop
- * Where the sobriety test battery was administered
- * Gaze Nystagnus score
- * Walk and Turn score
- * One Leg Stand score
- * Angle of onset of the nystagnus
- * Officer's estimate of the suspect's BAC
- * PBT result (except North Carolina where PBTs are not used)
- * Arrest disposition
- * Evidential BAC result (if the suspect was arrested for DWI)

If the evidential BAC results were not available at the end of the shift, then they were added to the data form as soon as they became available.

Efforts were made to secure data for all DWI traffic stops for all tests and to minimize the possibility that knowledge of PBT results would be available to officers before administering or recording battery scores. However, the data were collected in operational situations where the first priority was law enforcement and public protection rather than research data collection. It was not possible for researchers to routinely accompany the patrols and supervise or observe the actual data collection. Therefore, no statements can be made as to how closely the requested data collection procedures were followed.

On a few occasions, NHTSA researchers rode along with police officers during their normal duty tours and observed them administering and scoring the sobriety battery. The purpose of this procedure was to determine whether sobriety battery tests were being scored according to the standardized instructions and to assist the police officers in perfecting their testing techniques.

There were several other major sources of data collected during this project. All participating police officers were surveyed before the sobriety battery training session and after the completion of the three month usage period to determine their opinion of the utility of the sobriety battery.

The cooperating police departments agreed to collect DWI arrest data for a three month period prior to the field evaluation for use as comparison data. Also, court dispositions for the DWI arrests both before and during the field evaluation are to be collected as they become available.

In two of the police agencies (Washington, D.C. and North Carolina) control groups were established for comparison purposes. These officers were not trained in the use of the sobriety battery, but were requested to fill out information forms on each DWI stop made during the three month field evaluation period. The data they supplied were similar to that supplied by the specially trained police officers, with the exception of the sobriety battery test results.

-8-

The percent of drivers that were given all three sobriety tests varies from a low of 70 percent for the Arlington County Police to a high of 88 percent for the Maryland State Police. The average usage rates for all Police Agencies were 80 percent for the complete sobriety test battery, 89 percent for the Gaze Nystagmus, 84 percent for the Walk and Turn, and 82 percent for the One Leg Stand. PBT use exceeded the use of the behavioral tests except in Maryland.

Table 2 documents the resulting accuracy of the Combined Testing Procedure (Gaze Nystagmus and Walk and Turn tests) and the three individual sobriety battery tests. Accuracy refers to the test's ability to correctly classify the suspect's BAC as above or below .10% (using PBT data). As indicated in Table 1, the PBT was not given to all the drivers stopped by the police. Therefore, the accuracy figures in Table 2 cannot be considered as applying to the entire population of drivers expected to be stopped by the police on suspicion of DWI.

TABLE 2

Accuracy of the Behavioral Test Scoring
Procedures in Predicting BACs

| <u>Police Agency</u> | <u>Two Test Combination</u> | <u>Gaze Nystagmus</u> | <u>Walk & Turn</u> | <u>One Leg Stand</u> |
|-------------------------|---------------------------------|---------------------------|----------------------------|--------------------------|
| Arlington County Police | 76% | 75% | 72% | 72% |
| Maryland State Police | 96% | 96% | 94% | 92% |
| Washington, D.C. Police | 75% | 73% | 73% | 73% |
| All Police Agencies | 83% | 82% | 80% | 78% |
| Estimated from Lab Data | 80% | 77% | 68% | 65% |

The accuracy of the Combined Procedure for all Police Agencies (83 percent) compares favorably with the 80 percent accuracy computed from the laboratory data. Of the misclassifications; 16 percent involved classification of a driver's BAC as greater than or equal to 0.10% when his/her BAC was less than 0.10%; and 1 percent involved classifying a driver's BAC as less than 0.10% when his/her BAC was greater than or equal to 0.10%. Also, the ranking, with respect to accuracy, of the four scoring procedures remained the same as that obtained from the laboratory data, i.e., the relative ranking from most accurate to least accurate was Combined Procedure, Gaze Nystagmus, Walk and Turn, and One Leg Stand. However, the differences in accuracy among the three tests were less than in the previous laboratory study. There are two differences between the lab and field studies that may explain the somewhat different results (e.g., improved accuracy especially for walk and turn and one leg stand tests). First of all, the instructions regarding the interpretation of subjects performance scores were modified and were specific and definite about what scores indicated a DWI. The second difference is the BAC distribution of the subjects who were tested. We do not know the distribution for subjects stopped, nor for those tested, but only for those who were give a PBT or arrested and given an EBT. Therefore, it is difficult to estimate how important the difference in BAC distribution may be in accounting for the observed accuracy improvements.

The data in Table 2 should NOT be used to draw conclusions about the precise accuracy of using only one given test by itself as opposed to using another one of the three by itself. The main reason is that in most cases, all three

-10-

TABLE 3

Percent in Each BAC Category for Drivers
Arrested by Various Procedures*

| Procedure | False Positive 0 - .04% | Difficult To Assess Depends on Other Data .05 - .09% | Arrest Supported By BAC Data .10%+ | N |
|---|----------------------------|--|--|-------|
| 1. Normal Procedure Using PBT (D.C. Control) | 0 | 10 | 89 | (164) |
| 2. Sobriety Test Battery and PBT (D.C., MD & Arlington) | 2 | 8 | 90 | (581) |
| 3. Sobriety Test Battery, No PBT (NC); Arrest Indicated by 2 Test Combined Decision Rule Only | 4 | 11 | 86 | (279) |
| 4. Sobriety Test Battery No PBT (NC) Officer Arrest Only | 4 | 12 | 83 | (289) |
| 5. Normal Procedures, No PBT (NC) | 26 | 15 | 59 | (309) |

*some rows do not add to 100 due to rounding

-12-

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