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The Robustness of the Horizontal Gaze Nystagmus Test in Standardized Field Sobriety Tests

Law enforcement officers are trained in accordance with NHTSA/IACP guidelines to administer Standardized Field Sobriety Tests (SFSTs) to drivers suspected of alcohol impairment. The officer may later testify at a trial about the evidence that led to the arrest, including the driver's performance on the SFST. SFSTs consists of three tests: Horizontal Gaze Nystagmus (HGN), Walk-and-Turn (WAT), and One-Leg Stand (OLS).

Courts generally accept testimony about WAT and OLS, but may not admit testimony about HGN. During an HGN examination, the suspect stands with feet together and arms at the side. A suspect must then follow the movement of a stimulus with the eyes and the officer examines and scores each eye separately. Sometimes, minor procedural differences occur in the administration of an HGN test due to environment, weather, and the suspect's level of cooperation.

Courts have accepted arguments that variations from standard procedures in HGN administration may affect its validity and as a result render HGN testimony inadmissible. The effect of deviations from standard procedure on HGN scores has never been systematically studied. In addition, questions have been raised about the validity of the test when a suspect has functional vision in only one eye.

To ascertain whether minor variations in procedure affect the validity of HGN tests, NHTSA examined variations in HGN administration through laboratory experiments and field data collection. Under contract, the Southern California Research Institute conducted three experiments to examine the effects of procedural variations in the administration of an HGN test on the accuracy of the test.

Method

In each of the three experiments (summarized in Table 1), SFST-trained and experienced officers examined alcohol dosed participants under standard and altered administration conditions. The experiments were conducted in a double-blind procedure where neither the participants nor officers were aware of participants' BAC levels. Alcohol dose amounts were based on gender, age, and body composition and were calculated to produce expected peak BAC ≤ .12 at the end of a 30-minute absorption period.

Table 1. HGN Procedural Variations Examined

Experiment	Variable	Definition
1	Stimulus Speed	Rate of speed of the stimulus as it passes in front of a participant's eyes
	Stimulus Elevation	Vertical position of the stimulus relative to the participant's eye-level gaze
	Stimulus Distance	Distance of the stimulus from the participant's face
2	Participant's Posture	Participant standing, sitting, or lying down during examination
3	Participant's vision	Participant having monocular vision

The goal of the first experiment was to examine the effect of varying stimulus presentation during HGN examinations on officers' correct observations. Stimulus speed was evaluated at the standard 2-second pass and compared with a 1-second pass. Stimulus elevation was evaluated at the standard 2 inches above eye level and compared with presentations at eye level and 4 inches above eye level. Finally, stimulus distance was evaluated at the standard 12- to 15-inch range and compared with a 10- and 20-inch distance from the participant's face.

The second experiment examined the effect of a suspect's position during an HGN test. A standard HGN examination is conducted with a suspect standing, feet together, and arms at the sides. However, sometimes a suspect is unable to stand, and the test is administered with the suspect sitting or lying down. In this study, dosed participants received an HGN examination standing, sitting, and lying down.

The goal of the third experiment was to assess the validity of an HGN test when the suspect has monocular vision. When officers conduct the HGN test, they examine a suspect's eyes and score each eye separately, which may lead to discrepancies when a suspect has monocular vision. Therefore, an HGN test was conducted on participants with functional sight in one eye.

Experiments 1 and 3 were conducted in a laboratory setting. Experiment 2 was conducted in a field setting.

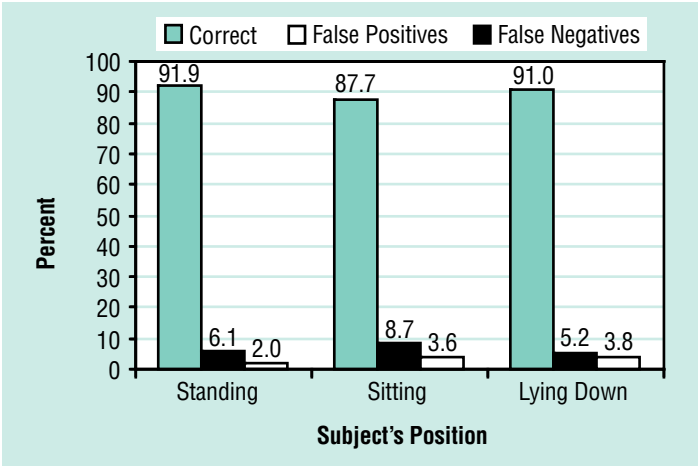
Findings

Overall, the laboratory experiments revealed that the officer-examiners did not err when participant BACs were .10 grams per deciliter or greater and rarely erred when participants' BACs were .08 g/dL or greater regardless of variations in stimulus presentation, participant position, or when participants had monocular vision.

With respect to specific variations in stimulus administration, a 1-second stimulus speed significantly increased the number of false-negative errors. In other words, a participant receives a score of no alcohol impairment when the participant was in fact impaired. The standard 2-second speed neither increased observational errors nor improved observations. Varying the level of the stimulus so that it was 4 inches above the eye or at eye level was no different than the results from the standard administration of 2 inches above eye-level. Finally, varying the distance of the stimulus from the face did not alter the HGN signs observed at 20 inches when compared to the standard distance of 12 to 15 inches from the participant's face. However, holding the stimulus 10 inches from a participant's face increased the number of HGN signs an examiner correctly observed.

In Experiment 2, participants' positions were varied for each HGN examination. Similar to the results of Experiment 1, standing, sitting, or lying down did not make a difference in number of correct observations (see Figure 1).

Figure 1. Officer's Scores by Participant Position



The goal of the third experiment was to determine if the HGN test did not correctly identify impaired individuals if the person in question has monocular vision. The results of the study revealed that the mean number of HGN signs was smaller in non-functional than functional eyes. The difference was statistically significant but small in magnitude. While the results are preliminary due to the small sample size, there was no evidence that participants' non-functional eyes affected HGN in their functional eyes. Moreover, there is no evidence that HGN signs in monocular individuals will lead to false arrests. The findings cannot be generalized to individuals whose visual deficits have differing etiologies.

Implications

The results of this study reveal that HGN is a robust phenomenon. Minor procedural variations do not compromise the validity of the HGN examination.

How to Order

For a copy of *The Robustness of the Horizontal Gaze Nystagmus Test* (36 pages plus appendices), write to the Office of Behavioral Safety Research, NHTSA, NTI-130, 1200 New Jersey Avenue SE., Washington, DC 20590, send a fax to 202-366-7096, or download from www.nhtsa.dot.gov. James Frank, Ph.D., and Jenny Percer, Ph.D., were the project officers.

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