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COMMENT

CAN YOUR EYES BE USED AGAINST YOU? THE USE OF THE HORIZONTAL GAZE NYSTAGMUS TEST IN THE COURTROOM*

I. INTRODUCTION

The National Highway Traffic Safety Administration ("NHTSA") developed a battery of tests¹ which it considers "the most effective procedure[s] for testing drivers at roadside to determine whether or not they are intoxicated."² These roadside sobriety tests are designed to gauge inebriation by evaluating a person's coordination, balance, and mental agility.³ Unlike chemical tests, jurors need only apply their common-sense knowledge of the world to appreciate the results of these "psychophysical" coordination tests. However, these tests also convey the "imprimatur of science," effectively making them difficult to repudiate.⁴

Horizontal gaze nystagmus ("HGN") is one such roadside sobriety test. This test is premised on the fact that the automatic tracking mechanisms of the eyes are affected by alcohol.⁵ Nystagmus is defined as "an involuntary rapid movement of the eyeball,

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¹ The NHTSA recommends that an officer administer the walk-and-turn test, the one-leg stand test, and the horizontal gaze nystagmus test. John Seelmeyer, *Nystagmus, A Valid DUI Test*, LAW & ORD., July 1985, at 29.

² 2 DONALD H. NICHOLS, DRINKING/DRIVING LITIGATION § 26:01, at 1 (1990).

³ Richard J. Essen & Marla Levenstein, *Roadside Sobriety Tests: Both "Scientific" and Unreliable*, DWI J., Nov. 1989, at 6.

⁴ *Id.* at 5. See, e.g., *United States v. Baller*, 519 F.2d 463, 466 (4th Cir.), cert. denied, 423 U.S. 1019 (1975) (because scientific techniques appear objective, opinions that claim scientific bases are "apt to carry undue weight with the trier of fact") (cited in MICHAEL H. GRAHAM, HANDBOOK OF FEDERAL EVIDENCE § 703.2 (3d ed. 1991)).

⁵ Edward B. Tenney, II, *The Horizontal Gaze Nystagmus Test and the Admissibility of Scientific Evidence*, 27 N.H. B.J. 179, 180 (1986). See, e.g., NHTSA DOT HS-805-864, DEVELOPMENTS AND FIELD TEST OF PSYCHOPHYSICAL TESTS FOR DWI ARREST App. A (1981).

which may be horizontal, vertical, rotatory, or mixed."⁶ It occurs naturally as one's eyes focus on all objects within their field of vision. In order to give the impression of imagery in motion, the eyes focus on each and every object individually and then track the sequence of objects at a high rate of speed.⁷ As a result, many people will show horizontal nystagmus as their eyes track objects to the extreme sides.⁸ Alcohol slows down the eyes' ability to rapidly track objects and causes the eyes to oscillate, or "jerk," before they normally would in a sober person.⁹ Nystagmus is more easily detectable in an intoxicated person because alcohol stimulates the nerve endings, thus making nystagmus more pronounced.¹⁰ The HGN test purports to gauge intoxication by measuring this involuntary oscillation of the eyes.¹¹

Several jurisdictions¹² use the results of roadside sobriety tests in the prosecution of "driving under the influence" ("DUI") cases.¹³ Yet some critics question the use of the HGN test as scientific evidence in the courtroom.¹⁴ Most judges and juries readily accept the walk-and-turn¹⁵ and the one-leg stand¹⁶ because they "know" that

⁶ State v. Witte, 836 P.2d 1110, 1112 (Kan. 1992) (quoting DORLAND'S ILLUSTRATED MEDICAL DICTIONARY 1068 (25th ed. 1974)).

⁷ Tenney, *supra* note 5, at 180.

⁸ NHTSA DOT HS-806-512, IMPROVED SOBRIETY TESTING 1 (1984).

⁹ *Id.* at 1.

¹⁰ Tenney, *supra* note 5, at 180.

¹¹ Gayle Tronvig Carper & William McCamey, *Gaze Nystagmus: Scientific Proof of DUI?*, 77 ILL. B.J. 146, 147 (1988).

¹² States that have rendered opinions on the HGN test include: Alabama, Alaska, Arizona, Arkansas, California, Delaware, Georgia, Idaho, Illinois, Iowa, Kansas, Kentucky, Louisiana, Montana, Missouri, Nebraska, New York, North Dakota, Ohio, Oregon, Pennsylvania, South Carolina, Tennessee, Texas, West Virginia, and Wisconsin.

¹³ The most common legal criterion for "under the influence" has been defined as relating to the "impairment of senses, judgment, and motor skills that makes driving after drinking alcohol dangerous." Jonathan D. Cowan & Susannah G. Jaffee, *Proof and Disproof of Alcohol-Induced Driving Impairment Through Evidence of Observable Intoxication and Coordinating Testing*, 9 AM. JUR. PROOF OF FACTS 3D 459, 474 (1989).

Most states have either a "presumptive" or an "illegal per se" limit for DUI of 0.10%. NHTSA DOT HS-807-186, DWI DETECTION AND DIVIDED ATTENTION FIELD SOBRIETY TESTING; A SELF INSTRUCTIONAL TRAINING PROGRAM FOR LAW ENFORCEMENT OFFICERS 19 (1987). A presumption of alcoholic influence means that it is presumed that the person is under the influence if he has a BAC of 0.10% or more. *Id.* at 45. Illegal per se is conclusive. Operating a motor vehicle with a BAC level of 0.10% or more is "an offense in and of itself." *Id.* at 48.

¹⁴ See, e.g., Mark A. Rouleau, *Unreliability of the Horizontal Gaze Nystagmus Test*, 4 AM. JUR. PROOF OF FACTS 3D 439, 462 (1989).

¹⁵ A subject assumes a heel-to-toe stance on a designated line with his arms at his sides. The subject then takes heel-to-toe steps on the line, then turns around while keeping one foot on the line, and returns in the same heel-to-toe step. NHTSA DOT HS-806-512, *supra* note 8, at 5.

¹⁶ The subject stands with his heels together, arms at sides, and raises one leg about

excessive alcohol in the blood can cause balance problems.¹⁷ On the other hand, the general public knows little about horizontal gaze nystagmus. Although scientifically well-documented, few persons have ever observed the eye movement of others who have elevated blood alcohol concentrations ("BAC").¹⁸

To overcome this problem, the NHTSA has provided manuals to establish experimental validity.¹⁹ According to the NHTSA, the greatest advantage of the HGN test is that a trained observer can accurately determine whether the blood alcohol content level of a test subject is above or below 0.10%²⁰ merely by administering the test.²¹ Some experts, however, question the use of the HGN test.²² Critics of the HGN test argue that, while it does have some merit, the test is not conclusive,²³ and, although based on scientific principles, it is unreliable.²⁴

This comment will address the use of horizontal gaze nystagmus as scientific evidence in the courtroom. Section II focuses on HGN as a technique for detecting intoxication and discusses the procedure adopted by the NHTSA for law enforcement use. This

six inches off the ground. He then must hold his leg in this position and count rapidly from 1001 to 1030. *Id.* at 7.

¹⁷ Eric Halperin & Robert L. Yolton, *Is the Driver Drunk? Oculomotor Sobriety Testing*, 57 J. AM. OPTOMETRIC ASS'N 654, 657 (1986). The authors suggest that such knowledge possibly derives from personal experience but they make no general statement about the actual weight that juries give to these tests once admitted as evidence.

However, the results of a 1974 survey of 1363 judges and lawyers in the United States reported that 75% of those surveyed believed that judges accorded scientific evidence greater weight than other evidence, and 70% believed that juries found scientific evidence more credible. Another survey involving jurors indicated that scientific evidence was the decisive factor in guilty verdicts for about 25% of those who served on juries. Paul C. Giannelli, Lecture at the Twenty-First Annual Kenneth J. Hodson Lecture on Scientific Evidence in Criminal Prosecutions (Mar. 26, 1992), in 137 MILWAUKEE L. REV. 167, 173 (1992).

¹⁸ Halperin & Yolton, *supra* note 17, at 657.

¹⁹ According to the 1981 NHTSA manual, "validity refers to the degree to which a test measures what it is designed to measure, which in the case of field sobriety tests, is the impairment produced by alcohol." NHTSA DOT HS-805-864, *supra* note 5, at 19.

²⁰ Although the "legal limit" of BAC varies from state to state, the majority of states have adopted 0.10% as the legal limit of intoxication. Halperin & Yolton, *supra* note 17, at 654.

²¹ 2 NICHOLS, *supra* note 2, at 1; *see, e.g.*, NHTSA DOT HS-802-424, PSYCHOPHYSICAL TESTS FOR DWI ARREST (1977).

²² *See, e.g.*, Halperin & Yolton, *supra* note 17, at 657.

²³ *See* James J. Ahern, *Handling DUI Cases*, in DEFENDING DUI AND RELATED CASES § 1.160 (Ill. Inst. for CLE ed., 1991).

²⁴ *See* Rouleau, *supra* note 14, at 452. Validity and reliability are not synonymous. "Validity" refers to the test's accuracy, and "reliability" refers to its consistency. For a test to be valid, it must also be reliable. PAUL C. GIANNELLI & EDWARD J. IMWINKELRIED, SCIENTIFIC EVIDENCE § 1-1, at 1 n.1 (1986); JOHN A. TARANTINO, STRATEGIC USE OF SCIENTIFIC EVIDENCE § 1.03 (1988).

section will also briefly address views expressed by proponents and opponents of HGN testing. Section III discusses the standards by which scientific evidence is admitted into evidence in the courtroom, specifically analyzing the recently established *Daubert*²⁵ relevancy approach, as well as the more traditional *Frye* standard of "general acceptance."²⁶

The next sections examine case law to consider how HGN testing has been accepted in various courts of law. Specifically, Section IV discusses *State v. Superior Court ex rel. County of Cochise (Blake)*.²⁷ This case has been relied on by almost every subsequent case, and is considered one of the most thoroughly researched and well-reasoned cases dealing with the issue of admissibility of the HGN test.²⁸ Section V examines and distinguishes the case law since *State v. Superior Court*. This section will comment on the strengths and weaknesses of various alternatives adopted by the courts, and will look at a direction that the courts may turn to in the future. Section VI suggests that courts devise a jury instruction that not only reflects the best aspects of the HGN test, but also mentions the test's limits, difficulties, and circumstances for unreliability. This comment concludes that despite its faults, the HGN test should be admitted at trial as reliable evidence.

II. HORIZONTAL GAZE NYSTAGMUS

Nystagmus is a well-known physiological phenomenon²⁹ involving rapid involuntary oscillation of the eyes.³⁰ Gaze nystagmus, or "jerk nystagmus," is characterized by a slow drift of the eyeball, "usually away from the direction of gaze, followed by a quick jerk or recovery in the direction of gaze."³¹ Using an imprecise definition such as "jerking of the eyes," however, can lead to confusion.³² Nystagmus is the slow drift of the eyeball toward the nose; a saccade is the quick corrective movement which returns the eyeball to the

²⁵ *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 113 S. Ct. 2786 (1993).

²⁶ See *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923). The *Daubert* court expressly rejected the *Frye* standard. Thus, in federal courtrooms, *Frye* no longer applies. Many states, however, still apply the *Frye* test. It remains to be seen whether these courts will eventually adopt the *Daubert* analysis or stay with *Frye*.

²⁷ 718 P.2d 171 (Ariz. 1986).

²⁸ See, e.g., *State v. Armstrong*, 561 So. 2d 883, 885 (La. Ct. App. 1990).

²⁹ *State v. Superior Court*, 718 P.2d at 177.

³⁰ 2 NICHOLS, *supra* note 2, at 1.

³¹ THE MERCK MANUAL OF DIAGNOSIS AND THERAPY 1980 (14th ed. 1982) [hereinafter MERCK MANUAL].

³² 2 NICHOLS, *supra* note 2 at 4; William A. Pangman, *Horizontal Gaze Nystagmus: Voodoo Science*, DWI J., Mar. 1987, at 2.

lateral position.³³ A layperson could conceivably mistake a saccade for nystagmus.³⁴

Research has shown that acute alcohol intoxication causes gross motor defects such as sluggish physical response, poor coordination, emotional instability, and behavior changes.³⁵ Further studies have shown that eye movement³⁶ is also affected by alcohol intoxication.³⁷ Relying on these connections, and finding that excessive alcohol will affect driving skills, the NHTSA devised its field sobriety tests.³⁸

The NHTSA's 1977 report³⁹ evaluated six roadside tests and found that not only are signs of alcohol intoxication in the eyes easily assessed by visual observation, but that among the psychophysical roadside tests, the eyes afford the most sensitive means for assessing whether a driver is legally intoxicated.⁴⁰ In 1984, the NHTSA published a highly-anticipated manual for the purpose of teaching police officers the most effective means of testing roadside intoxication.⁴¹ The NHTSA claimed that proper execution of the walk-and-turn, one-leg stand, and HGN tests could determine blood alcohol concentration of 0.10% or more at roadside.⁴²

The NHTSA's proposed HGN test requires that the administering officer stand directly in front of his subject.⁴³ The suspect stands at attention, keeping his feet together and his arms by his sides.⁴⁴ The officer gives the test outside the vehicle in a well-lighted area.⁴⁵ The driver's glasses are removed,⁴⁶ and the test is

³³ 2 NICHOLS, *supra* note 2, at 4.

³⁴ *Id.*

³⁵ See Gregory W. Good & Arol R. Augsburger, *Use of Horizontal Gaze Nystagmus as a Part of Roadside Sobriety Testing*, 63 AM. J. OPTOMETRY & PHYSIOLOGICAL OPTICS 467 (1986).

³⁶ Smooth pursuits are normal eye movements. Improper eye tracking includes positional and gaze nystagmus, saccades, and caloric eye tracking patterns. *Id.* See also Yoshio Umeda & Eiji Sakata, *Alcohol and the Oculomotor System*, 87 ANNALS OTOLGY, RHINOLOGY & LARYNGOLOGY 392 (1978) (recording effects of alcohol on all eye movements).

³⁷ Good & Augsburger, *supra* note 35, at 467.

³⁸ Essen & Levenstein, *supra* note 3, at 6.

³⁹ NHTSA DOT HS-802-424, *supra* note 21.

⁴⁰ Good & Augsburger, *supra* note 35, at 468.

⁴¹ NHTSA DOT HS-806-512, *supra* note 8, at 1.

⁴² The manual recommends monthly precision checks so that officers sustain their accuracy in gauging intoxication and also warns that improper use of the test will render results inaccurate. *Id.* at 1-2.

⁴³ Dennis Lusk, *Horizontal Gaze Nystagmus*, 23 ARIZ. B.J. 27, 28 (1988).

⁴⁴ Good & Augsburger, *supra* note 35, at 469.

⁴⁵ NHTSA DOT HS-806-512, *supra* note 8, at 1.

⁴⁶ Paul S. Helzer, *Detecting DUIs Through the Use of Nystagmus*, LAW & ORD., Oct. 1984, at 93. Glasses are removed because they may block the officer's view of the suspect's eyes. NHTSA DOT HS-806-512, *supra* note 8, at 4.

not administered if the suspect is wearing hard contact lenses for fear of dislodging a lens⁴⁷ or hindering eye movement.⁴⁸ Holding a pen or finger twelve to fifteen inches away from the subject's face, just above eye level, the officer instructs the suspect to cover one eye and, with the open eye, follow the pen (or finger) while keeping the head stationary.⁴⁹

Using this method, the NHTSA found a strong correlation between the angle at which the onset of gaze nystagmus is first detected, and the blood alcohol concentration ("BAC") of the subject.⁵⁰ Thus, a person's BAC level may be estimated with the following equation: *Angle of onset of gaze nystagmus = 51° - (105) (percent BAC)*.⁵¹ If HGN is observed at an angle of forty-five degrees from the subject's nose,⁵² the equation yields a BAC of 0.10%. The NHTSA claims that officers who use this equation and follow the proper HGN test procedures can accurately classify the subject as having a BAC of at least 0.10% in 78 out of 100 cases.⁵³

In addition to using the equation to estimate BAC, the NHTSA manual instructs officers to look for three signs of intoxication in each eye.⁵⁴ These signs are: (1) onset of alcohol gaze nystagmus in right eye occurs before forty-five degrees; (2) nystagmus in the right eye, when moved as far as possible to the right, is moderate or distinct; (3) right eye cannot follow a moving object smoothly; (4) onset of alcohol gaze nystagmus in left eye occurs before forty-five degrees; (5) nystagmus in the left eye, when moved as far as possible to the left, is moderate or distinct; (6) left eye cannot follow a moving object smoothly.⁵⁵ The officer administering the test gives one point for each sign of intoxication for a maximum (failing) score of six points. If the suspect scores four or more points, his BAC is classified as 0.10% or higher.⁵⁶

The NHTSA's study has received both praise and criticism. Proponents of HGN testing favor it because an experienced drinker⁵⁷ could have a BAC of 0.13% or 0.14% and still pass the

⁴⁷ Halperin & Yolton, *supra* note 17, at 655.

⁴⁸ NHTSA DOT HS-806-512, *supra* note 8, at 4.

⁴⁹ See Good & Augsburger, *supra* note 35, at 469.

⁵⁰ 2 NICHOLS, *supra* note 2, at 2.

⁵¹ Good & Augsburger, *supra* note 35, at 468.

⁵² 2 NICHOLS, *supra* note 2, at 2.

⁵³ See Pangman, *supra* note 32, at 2.

⁵⁴ Good & Augsburger, *supra* note 35, at 469.

⁵⁵ NHTSA DOT HS-806-512, *supra* note 8, at 4.

⁵⁶ *Id.*

⁵⁷ Just as individuals differ greatly in their abilities, talents, and appearances when sober, their coordination and abilities also differ when affected by alcohol. While alcohol may impair one person, the same dosage may not only relax another, but may actu-

traditional field tests, thus evading arrest.⁵⁸ In contrast, a person cannot voluntarily control HGN, and an officer properly trained in the use of the test can get a more accurate indication of the individual's level of intoxication.⁵⁹ In fact, some proponents claim that a driver's BAC level can be accurately estimated within 0.02% by an officer who is properly trained in HGN testing procedures.⁶⁰ Moreover, supporters of HGN testing argue that it violates no constitutional right.⁶¹ Finally, officers favor it because a defendant's attorney cannot complain of language problems⁶² arising during the test.⁶³

The HGN test is also reported to be the most accurate of the roadside sobriety tests. When an officer "grades" a suspect according to the aforementioned six point scale, the officer's accuracy rate is reported to be seventy-seven percent.⁶⁴ The walk-and-turn test⁶⁵

ally improve his test scores. Such a variation among individuals is further compounded by the fact that officers usually do not have "sober coordination" scores to use as comparisons. Cowan & Jaffee, *supra* note 13, at 472-73.

⁵⁸ See *State v. Superior Court ex rel. County of Cochise (Blake II)*, 718 P.2d 189, 192 (Ariz. Ct. App. 1986). This is germane to those jurisdictions that define DUI according to a specific BAC level of 0.10%. States affected include Arizona, Kansas, and Ohio.

⁵⁹ *Id.*

⁶⁰ Ahern, *supra* note 23, at § 1.160; Good & Augsburger, *supra* note 35, at 468.

⁶¹ Carper & McCamey, *supra* note 11, at 149. Sobriety testing is neither interrogation nor testimonial evidence and is therefore not protected by the Fifth Amendment. *Pennsylvania v. Muniz*, 110 S. Ct. 2638 (1990). See, e.g., *State v. Superior Court (Spears)*, 742 P.2d 286 (Ariz. Ct. App. 1987); *People v. Lowe*, 687 P.2d 454 (Colo. 1984); *Wahpeton v. Skoog*, 300 N.W.2d 243 (N.D. 1980) (finding that roadside sobriety tests are not communicative, but rather real or physical evidence, and do not warrant constitutional protection against self-incrimination).

The United States Supreme Court has also held that roadside sobriety checkpoints and searches do not violate the Fourth Amendment. See *Michigan Dep't of State Police v. Sitz*, 110 S. Ct. 2481 (1990); *State v. Superior Court ex rel. Cochise (Spears)*, 742 P.2d 286 (Ariz. 1987); *State v. Harrison*, 618 A.2d 1381 (Conn. App. Ct. 1993); *State v. Lawrence*, 843 P.2d 488 (Or. Ct. App. 1992).

⁶² For other roadside sobriety tests, a driver must pay close attention to a series of instructions in order to accurately perform the physical tests. See *supra* notes 15-16. In contrast, for the HGN test, the driver need only follow one instruction—look straight ahead and follow the police officer's pen or finger. See *supra* note 49 and accompanying text.

⁶³ Boris Yaro, *His Frustrations Led Him to Help Develop a Standardized Field Sobriety Test, Sgt. Studdard: A Fight Against Drunk Drivers*, L.A. TIMES, Feb. 17, 1985, at 12.

⁶⁴ NHTSA DOT HS-806-512, *supra* note 8, at 1; Good & Augsburger, *supra* note 35, at 468. These figures were determined to be accurate because the test subjects were dosed to specific BAC levels between 0.10% and 0.19% and then the police officers' scores were compared to the actual BAC levels. NHTSA DOT HS-806-512, *supra* note 8, at 1.

As for the field tests, roadside tests were compared to actual BAC levels, which were obtained through breath analyses once an arrest was made. Good & Augsburger, *supra* note 35, at 470.

⁶⁵ The walk-and-turn is graded on a nine-point scale. Grading is as follows:

provides a correct diagnosis sixty-eight percent of the time, and the one-leg stand has an accuracy rate of sixty-five percent.⁶⁶ However, when the HGN test is combined with the walk-and-turn test, there is a eighty percent accuracy rate.⁶⁷

These results seem to suggest that the HGN test is considerably more accurate than the psychophysical tests to gauge intoxication at roadside. But to reach such a conclusion is somewhat misleading, as these percentages came from the NHTSA's 1984 laboratory study involving 441 subjects who were administered various levels of alcohol.⁶⁸ The NHTSA also reported the results of a field study involving 1500 drivers who were pulled over on the road.⁶⁹ In that case, the accuracy rates were as follows: HGN, eighty-two percent, walk-and-turn, eighty percent, one-leg stand, seventy percent, and combination of HGN and walk-and-turn, eighty-three percent.⁷⁰

The disparity between the results of the laboratory and field tests raises several questions and criticisms. What at first appears to be a rather significant finding in the laboratory test (that the HGN test is nine to twelve percent more accurate than the walk-and-turn and one-leg stand) seems somewhat negligible in the field study. The field study indicates that by adding the HGN test, police officers will be more accurate in predicting intoxication above the legal limit at the most two to three percent of the time.

Moreover, the NHTSA fails to explain why the laboratory results produced lower accuracy rates when the laboratory tests ap-

(1) cannot keep balance while listening to instructions (1 point); (2) starts before the instructions are finished (1 point); (3) while walking, stops to steady self (1 point); (4) does not touch heel-to-toe (1 point); (5) steps off the line (1 point); (6) uses arms to balance (1 point); (7) loses balance while turning or turns incorrectly (1 point); (8) incorrect number of steps (1 point); (9) cannot do test (9 points).

A score of two or more points classifies the suspect as having a BAC of 0.10% or more. NHTSA DOT HS-806-512, *supra* note 8, at 5 (*cited in State v. Whiteacre*, 601 N.E.2d 691, 698 (Bowling Green Mun. Ct. 1992)).

⁶⁶ Good & Augsburger, *supra* note 35, at 468.

⁶⁷ The NHTSA provides a "decision table" to effectively broaden the range of potential suspects with BACs of 0.10% or higher. As previously stated, the decisive score for the HGN test is a four out of six and a two out of nine for the walk-and-turn test. However, by using the NHTSA grid system, a suspect can score higher on one test and lower on the other and be classified as at least a 0.10%. For example, the table indicates that a suspect is likely to have a BAC of at least 0.10% if he scores a three on the HGN and a three on the walk-and-turn. NHTSA DOT HS-806-512, *supra* note 8, at 6.

⁶⁸ *Id.* at 1.

⁶⁹ *Id.* The NHTSA does not try to hide this difference. The two findings are presented together. The comment's purpose in offering these results in this way is to merely demonstrate why such statistics should not be accepted without inquiry. Moreover, articles that refer to the NHTSA's findings sometimes fail to specify whether they are relying on the laboratory or field studies.

⁷⁰ *Id.*

peared to be more carefully controlled. Nor does the 1984 manual describe the conditions under which these field tests were given. It merely lists the states that participated in the exercise. While it is commendable that police officers are able to identify a person driving under the influence, the manual does not elaborate whether the field success rate was due in part to other tell-tale signs of intoxication. For example, such signs include a swerving car, physical appearance, breath odor, condition of the eyes, color of the face, dexterity, speech, and demeanor.⁷¹

Not only do the results of the tests raise questions, but the NHTSA's premise that a person with a 0.10% BAC level will display horizontal gaze nystagmus at a forty-five degree angle is disputed as well. Other studies indicate not only that the onset of HGN may appear at angles other than forty-five degrees when the subject has a BAC of 0.10%, but that HGN may appear at lower BAC levels as well. For example, Professor Pangman notes that one researcher observed HGN at forty degrees with a BAC level of 0.06%, and that the onset of HGN also appeared at a thirty degree angle with a BAC as low as 0.048%.⁷²

This difference obviously raises questions about the reliability of the HGN test. If nystagmus could appear in people at levels as low as 0.048%, many would be arrested for DUI when they are not legally intoxicated. Although it may be wrong to drive after consuming alcohol,⁷³ a driver has not violated any law unless he has a BAC level of at least 0.10%. Moreover, people with BAC levels of 0.10% may not exhibit gaze nystagmus until their eyes deviate to an angle of fifty-one degrees.⁷⁴ If the suspect has learned to pass the psychophysical tests, the HGN test may also not detect intoxication.

The NHTSA's experimental procedure has been further challenged for its intentional screening out of those individuals highly likely to be misclassified as false positives.⁷⁵ Reportedly, "[f]ifty to sixty percent of all individuals exhibit a gaze nystagmus indistinguishable from AGN [Alcohol Gaze Nystagmus] if they deviate their

⁷¹ *Id.*

⁷² Pangman, *supra* note 32, at 2; 2 NICHOLS, *supra* note 2, at 3.

⁷³ Many groups have responded to the magnitude of the drunk driving problem by campaigning for or passing legislation to limit the extent of drunk driving and its consequences. Such groups include the insurance industry, Mothers Against Drug Driving (MADD), the federal government, and state governments. Kelly Mahon Tullier, *Governmental Liability for Negligent Failure to Detain Drunk Drivers*, 77 CORNELL L. REV. 873 (1992). See also NHTSA DOT HS-807-186, *supra* note 13, at 8.

⁷⁴ One researcher reported such a result. 2 NICHOLS, *supra* note 2, at 3.

⁷⁵ Pangman, *supra* note 32, at 2.

eyes more than forty degrees to the side."⁷⁶

It comes as no surprise that false positives did not interfere with NHTSA's results when one realizes that any test subjects showing moderate to strong nystagmus at maximum lateral deviation of the eyes and zero BAC were given placebo doses of alcohol, in order to *deliberately* screen out people at high risk for being classified as false positives.⁷⁷

Thus, the NHTSA's reasoning is flawed because it incorrectly assumes that the influence of drugs is solely responsible for any nystagmus detected at maximum lateral deviation in alcohol-free subjects.⁷⁸ One must then question whether this screening process has completely vitiated all other data based on the tests.

In fact, opponents of HGN testing refer to several elements other than alcohol that may cause HGN, raising questions about its use as a suitable predictor of intoxication.⁷⁹ For example, nystagmus can be congenital,⁸⁰ accompany disease,⁸¹ be induced mechanically, or even be associated with a person's occupation.⁸² Drugs, including anticonvulsants,⁸³ antibiotics, salicytes,⁸⁴ anti-inflammatory agents, and antihistamines,⁸⁵ can also produce nystagmus. Nystagmus can accompany stress or allergies⁸⁶ or result from a change in prescription glasses or cataract surgery.⁸⁷ Moreover, many motorists, when suddenly confronted by police officers and the flashing lights of patrol cars, may fail the test due to sheer ner-

⁷⁶ 2 NICHOLS, *supra* note 2, at 2.

⁷⁷ *Id.*

⁷⁸ *Id.* at 3.

⁷⁹ See, e.g., James Norris, *The Correlation of Angle of Onset Nystagmus with Blood Alcohol Level: Report of a Field Trial*, 25 J. FORENSIC SCI. SOC'Y 476 (1985); Ahern, *supra* note 23, at § 1.160.

⁸⁰ THE MERCK MANUAL OF DIAGNOSIS & THERAPY, a medical reference book, lists a variety of conditions which could cause such a motor disorder. Besides congenital origins, it is common in multiple sclerosis and may be due to conditions affecting the brain, such as palsy of lateral or vertical gaze, disorders of the vestibular apparatus and brainstem, and cerebellar dysfunction. See MERCK MANUAL, *supra* note 31, at 1980.

⁸¹ Factors which bring about nystagmus include inner ear problems, influenza, streptococcus infections, vertigo, measles, syphilis, arteriosclerosis, muscular dystrophy, multiple sclerosis, Korsakoff's Syndrome, brain hemorrhage, epilepsy, and other psychogenic disorders. Pangman, *supra* note 32, at 3.

⁸² Ahern, *supra* note 23, at § 1.160.

⁸³ NHTSA DOT HS 806-512, *supra* note 8, at 4.

⁸⁴ Ahern, *supra* note 23, at § 1.160.

⁸⁵ Rouleau, *supra* note 14, at 455.

⁸⁶ Nystagmus is also brought on by hypertension, motion sickness, sunstroke, eyestrain, eye muscle fatigue, glaucoma, changes in atmospheric pressure, and consumption of caffeine, nicotine, or aspirin. Pangman, *supra* note 32, at 3.

⁸⁷ Temporary nystagmus may result from extended use of the eyes under strained conditions or from continued use in insufficient lighting. *Id.*

vousness.⁸⁸ Thus, there are many causes of HGN, most of which are not related to BAC, that undermine the reliability of HGN testing in DUI cases.

To further support the position against admitting HGN results into evidence, critics compare HGN results to that of the polygraph.⁸⁹ The polygraph test purports to be ninety to ninety-five percent reliable, yet it is not admissible evidence.⁹⁰ The HGN test is similar to the polygraph test because both base their results on the subjective conclusions of the examiner. Although the polygraph requires added proof that the machine is in working order, both tests acknowledge that the accuracy of the results depends upon the examiner's qualifications in administration and interpretation of the test.⁹¹ For this reason, critics argue, if the polygraph is not admissible, the less accurate HGN test should not be accepted either.⁹²

Yet the polygraph test is distinguishable from the HGN test. First, the polygraph is an anomaly, as its results go to the ultimate issue of credibility,⁹³ meaning that the test purports to indicate with a degree of certainty whether a witness is credible.⁹⁴ Since the finder of fact is responsible for determining the credibility of witnesses, "[a] potential trial by polygraph is an unwarranted intrusion into the jury function."⁹⁵

⁸⁸ Jesse Katz, *Field Sobriety Test One Simple Tool*, L.A. TIMES, Sept. 8, 1988, at 1.

⁸⁹ The polygraph measures various physiologic responses which are precipitated by emotional reactions. The theory behind this technique is that when an individual consciously decides to lie, various involuntary physiological changes arise due to reactions in the autonomic nervous system. The polygraph machine measures these responses. See *State v. Brown*, 687 P.2d 751, 760-61 (Or. 1984). The examiner must then interpret these responses and "infer the presence of deception." TARANTINO, *supra* note 24, at § 602. The polygraph is unrelated to the topic of roadside sobriety testing. Its function in this paper is to offer a means of comparison.

⁹⁰ *Essen & Levenstein, supra* note 3, at 8. See, e.g., *People v. Baynes*, 430 N.E.2d 1070 (Ill. 1982) (courts refuse to admit unstipulated polygraph evidence because of serious doubts about the reliability and scientific recognition of the tests); *Brown*, 687 P.2d at 751 (polygraph evidence not admissible in any civil or criminal proceeding that is controlled by rules of evidence); ANDRE A. MOENSSENS ET AL., SCIENTIFIC EVIDENCE IN CRIMINAL CASES § 14.09, at 712 (3d ed. 1986). But cf. Edward J. Imwinkelried, *The Standard for Admitting Scientific Evidence: A Critique from The Perspective of Juror Psychology*, 28 VILL. L. REV. 554, 567-68 (1982-83) (questioning assumption that scientific evidence unduly influences jurors when studies suggest that juries have rendered verdicts inconsistent with polygraph evidence).

⁹¹ *Baynes*, 430 N.E.2d at 1074. Like HGN opponents, those opposed to the polygraph also question the extent to which false positives are displayed. The polygraph is also criticized to the extent that suspects are coached beforehand on how to pass the test. MCCORMICK ON EVIDENCE § 206(B) (John William Strong ed., 4th ed. 1992).

⁹² See, e.g., Cowan & Jaffee, *supra* note 13, at 470.

⁹³ *Baynes*, 430 N.E.2d at 1074.

⁹⁴ *Brown*, 687 P.2d at 774.

⁹⁵ *Baynes*, 430 N.E.2d at 1079.

On the other hand, the function of the HGN test is to spot visual symptoms of intoxication.⁹⁶ The information obtained facilitates a conviction for DUI; it is not used to attack the truthfulness of the defendant's statements. HGN evidence is valuable insofar as it strengthens a case based upon a chemical test. Although chemical tests may prove a high BAC level at the time of testing, they may not establish an irrefutable case of driving under the influence of alcohol.⁹⁷ To establish a causal connection between high blood alcohol concentration and driving impairment, it is essential to show that while the driver was operating his vehicle, he was indeed affected by alcohol.⁹⁸ Roadside sobriety tests help provide such proof.

The HGN test is more comparable to other tests.⁹⁹ An analogy to hair analysis, for example, seems more appropriate.¹⁰⁰ Since hair analysis is based on subjective visual observation and is routinely admitted in court,¹⁰¹ the HGN test, which is also based on visual

⁹⁶ NHTSA DOT HS-806-512, *supra* note 8, at 1.

⁹⁷ Cowan & Jaffee, *supra* note 13, at 468.

⁹⁸ *Id.* See also Ned R. Jaekle, *Constitutional Issues in Roadside Sobriety Testing*, 20 COLO. LAW. 45 (1991).

⁹⁹ There are two tests in particular that are comparable to HGN testing. One, hair analysis, is discussed in the main text. A second test is on-site chemical screening. On-site chemical screening tests are used by law enforcement as preliminary non-specific field tests to classify and identify various controlled substances. GIANNELLI & IMWINKELRIED, *supra* note 24, at § 23-2(B); *United States v. Williams*, 902 F.2d 678, 680 (11th Cir. 1990). On-site drug screening involves the use of non-specific color change tests in which an unidentified substance is mixed with a known reagent. The chemical reaction will produce a color which is then compared to a color chart to suggest a possible substance. GIANNELLI & IMWINKELRIED, *supra* note 24, at § 23-2(B).

The use of these results are similar to what the NHTSA recommends for HGN. These on-site screening tests are not conclusive, as the colors only represent a broad spectral range of possible drugs. Thus, they are not intended to be used to positively identify a substance. Walter J. Stall, *Unreliability of Field Tests as Means of Identifying Controlled Substances*, 12 ADVOC. 398, 399 (1982); R.A. Velapoldi & S.A. Wicks, *The Use of Chemical Spot Test Kits for the Presumptive Identification of Narcotics and Drugs of Abuse*, 19 J. FORENSIC SCI. 636, 655 (1974) (asserting on-site test kits merely provide preliminary and presumptive evidence; identification of a substance should not be made on this evidence alone). See also, *State v. Jacques*, 579 P.2d 146, 156 (Kan. Ct. App. 1978); *Curtis v. State*, 548 S.W.2d 57, 59 (Tex. Crim. App. 1977) (results of a marquis reagent test not conclusive, as it indicates only that an opium derivative is present).

Similarly, the HGN test recognizes nystagmus in the eye, but the witness may not testify that alcohol is the sole cause of the nystagmus. Rather, the expert may only testify that alcohol is one of the causes of nystagmus. See *State ex rel. Hamilton v. City Court of Mesa*, 799 P.2d 855 (Ariz. 1990).

¹⁰⁰ Trace evidence, such as hair, is used to identify perpetrators of crimes. TARANTINO, *supra* note 24, at § 3.01. One judicially accepted method is for an expert to render an opinion as to the identity of an individual source of human hair through microscopic or chemical means. *Id.* at §§ 3.17-18.

¹⁰¹ See *People v. Pride*, 833 P.2d 643 (Cal. 1992) (holding hair comparison evidence identifying a suspect or victim as a possible donor has been routinely admitted in California for many years without any suggestion that it is unreliable under *Frye*); Common-

observation, should therefore, not necessarily be discounted. Hair analysis is not an exact science. Technicians are unable to positively conclude that a hair sample came from a particular individual.¹⁰² Thus, a qualified witness on hair identification and comparison can provide relevant testimony but cannot make a positive identification.¹⁰³ A "match" means that two samples share general characteristics, not that they are identical.¹⁰⁴ Likewise, in the absence of chemical analyses, police officers may not testify to an exact BAC level.¹⁰⁵ Just as hair experts can testify that samples were "alike," "similar," or "compatible,"¹⁰⁶ the HGN "expert" can say that based on his observations of the onset of HGN at forty-five degrees, results indicate possible neurological dysfunction, which may be caused by alcohol ingestion.¹⁰⁷

On the other hand, although the HGN test is similar to hair analysis, hair analysis seems to offer a defendant an added protection that HGN does not afford. A hair sample can be reexamined at a later date in order to get more than one opinion as to a match. Thus, any difference in expert opinion applies to the weight of the evidence, not to the admissibility.¹⁰⁸ The HGN test, in contrast, is wholly subjective—the police officer has no physical sample to take to a laboratory. Thus, the suspect is not able to have his expert examine the evidence. The defendant, therefore, cannot contradict the officer's testimony. He can only try to damage the officer's credibility by questioning the officer's ability to administer the test and his knowledge of the theories behind the HGN test.¹⁰⁹

Aside from the lack of lingering physical evidence, however, HGN is quite similar to hair analysis in terms of the appropriate weight accorded to the evidence by the jury. In both cases, the test results are presented by an "expert" whom the jury may believe just because of his aura of expertise. The defendant's attorney, there-

wealth v. McCauley, 588 A.2d 941, 947 (Pa. Super. Ct. 1991) (holding microscopic hair comparison evidence is admissible as scientific evidence under *Frye*).

¹⁰² MOENSSENS ET AL., *supra* note 90, at § 8.09.

¹⁰³ State v. Bridges, 421 S.E.2d 806, 808 (N.C. Ct. App. 1992).

¹⁰⁴ TARANTINO, *supra* note 24, at § 3.18.

¹⁰⁵ State *ex rel.* Hamilton v. City Court of Mesa, 799 P.2d 855, 857 (Ariz. 1990).

¹⁰⁶ TARANTINO, *supra* note 24, at § 3.18.

¹⁰⁷ *Hamilton*, 799 P.2d at 860.

¹⁰⁸ MOENSSENS ET AL., *supra* note 90, at § 8.14 (citing *People v. Kirkwood*, 160 N.E.2d 766 (Ill. 1959), *cert. denied*, 363 U.S. 847 (1960)); *see also* *United States v. Oaxaca*, 569 F.2d 518, 526 (9th Cir. 1978) (holding hair comparison testimony admissible even though expert acknowledged some two million people had similar hair; the uncertainty of the match goes to the weight of the evidence, not to the admissibility).

¹⁰⁹ Rouleau, *supra* note 14, at 480-89. *See, e.g.*, *State v. Gleason*, 844 P.2d 691, 693 (Idaho 1992).

fore, must cross-examine the expert to expose the potential weaknesses of the test.

One of the test's shortcomings is that the officer administering the test may not be properly trained to understand all aspects of the test and to produce results as accurately as the NHTSA manual suggests.¹¹⁰ Thus, the "expert" faces a series of questions attacking his technique in administering the test. In cases involving hair analysis, an expert can be asked whether he obtained the requisite number of hairs from a subject to ensure that the ranges of all characteristics are adequately represented.¹¹¹ Moreover, it is recommended that head hair samples be taken from five different areas of the scalp. Samples should be both pulled and combed. For exclusionary purposes, samples should be taken from all persons who might be considered the source of the hair.¹¹²

Questions about following proper procedure are also asked to experts in DUI cases involving HGN testing. Although an officer may use his flashlight as a chinrest for the suspect, the stability of the head is a critical factor in determining the accuracy of the test.¹¹³ Other problems with accuracy include: whether the police officer followed the NHTSA's recommendation that initial movement should be made at the rate of about twenty degrees per second; whether the officer knew how far the stimulus (pen or finger) should be held from the suspect's face; and whether the twitching of the eyes was really caused by twitching of the penlight.¹¹⁴ Furthermore, the time of day has proven to be a relevant factor in HGN testing.¹¹⁵ For example, some argue that the test is unreliable due to the difficulty in accurately determining a forty-five degree angle in varying light conditions, especially late night.¹¹⁶ During training, each officer learns to determine a forty-five degree angle by using a template.¹¹⁷ Such devices are unavailable in the field.¹¹⁸ Finally, just as

¹¹⁰ Officers are required to spend a certain amount of time attending training sessions in order to be certified. See *In re Doe*, 844 P.2d 679, 680 (Haw. Ct. App. 1992); *Emerson v. State*, 846 S.W.2d 531, 532 (Tex. Ct. App. 1993); Seelmeyer, *supra* note 1, at 30.

¹¹¹ MOENSSENS ET AL., *supra* note 90, at § 8.10.

¹¹² *Id.*

¹¹³ Pangman, *supra* note 32, at 3.

¹¹⁴ Rouleau, *supra* note 14, at 483.

¹¹⁵ See Steve Rothaus, *Judges Are Divided on Eye Test for DUI*, MIAMI HERALD, Apr. 30, 1991, at 3B; Pangman, *supra* note 30, at 3.

¹¹⁶ See Rothaus, *supra* note 115, at 3B. On a similar note, one study looked at biorhythms which affect internal biological clocks and found that after midnight, the angle of onset was decreased by five degrees. Critics of the HGN test note that fact that this type of "sensitivity enhancement" was omitted from the NHTSA's manual. Pangman, *supra* note 32, at 3.

¹¹⁷ It is suggested that the officers examine the eyes of four or five people so that they

a hair analysis expert can testify that there is no technique known that can positively identify a crime scene hair as coming from a specific individual,¹¹⁹ the expert in HGN testing should admit that the HGN test does have several faults, the most serious of which is the number of causes of HGN other than alcohol.

Although there is much to discuss on cross-examination, the defense must face the possibility that the jury will simply take the officer's word as truth,¹²⁰ not realizing that the defense has raised legitimate concerns about the HGN test. Yet, such a potential problem should not automatically discount the admissibility of the HGN test. This comment rejects the analogy made by critics to the polygraph test and embraces and approach similar to hair analysis. Thus, pending further analysis, it is premature to reject the HGN test outright based on initial criticism.

III. JUDICIAL STANDARDS

If HGN testing is effectively used in trials, it could act as a deterrent to driving while intoxicated. If violators fear that they will be caught and successfully prosecuted, there is a chance that they will stop committing DUI offenses.¹²¹ Public policy, however, is not a sufficient reason to freely admit HGN test results into evidence. Because its accuracy depends upon human proficiency, the HGN test is not conclusive. Therefore if this test is to be admissible, the courts must choose a standard by which to judge admissibility of this scientific evidence.

Rules of evidence exist to prevent unfair prejudice, jury confusion, and undue consumption of time and trial resources.¹²² Thus, courts may exclude relevant¹²³ evidence if its probative value is outweighed by its prejudicial effect.¹²⁴ Unlike other forms of testi-

become familiar with a 45 degree angle of gaze. They should then practice without the device to be sure that their accuracy has been sustained. NHTSA DOT HS-806-512, *supra* note 8, at 3.

¹¹⁸ Halperin & Yolton, *supra* note 17, at 655. The DOT manual does not say why a template is not used in the field. Although it may seem cumbersome or unusual, it may enable the police officers to be able to state more definitely that the angle that they recorded was accurate.

¹¹⁹ MOENSSENS ET AL., *supra* note 90, at § 8.13.

¹²⁰ Rouleau, *supra* note 14, at 456.

¹²¹ NHTSA DOT HS-807-186, *supra* note 13, at 11.

¹²² State v. Superior Court *ex rel.* County of Cochise (Blake), 718 P.2d 171, 178 (Ariz. 1986) (citing State v. Hurd, 432 A.2d 86 (N.J. 1981)). See also FED. R. EVID. 102.

¹²³ Evidence is relevant if it has "any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence." FED. R. EVID. 401.

¹²⁴ FED. R. EVID. 403.

mony, however, the probative value of scientific evidence is often overestimated.¹²⁵ Lawyers note that jurors will often attribute an "aura of special reliability and trustworthiness" to such evidence.¹²⁶ Because jurors may overestimate the probative value of scientific evidence, courts apply special rules of admissibility to such testimony.¹²⁷ The following sections explore three standards that courts use to judge the admissibility of scientific evidence.

A. THE *FRYE* TEST

One approach, which until recently has predominated in most jurisdictions,¹²⁸ and which has been used thus far by most state courts ruling on the admissibility of HGN evidence, holds scientific evidence to a "special, extraordinary standard" of admission.¹²⁹ This traditional standard, which requires "general acceptance" of scientific evidence, was announced in *Frye v. United States*.¹³⁰ In *Frye*, the defendant was convicted of murder after the trial court sustained the government's objection to the defendant's introduction of the results of a systolic blood pressure deception test.¹³¹ Defense counsel attempted to introduce the testimony of the scientist who conducted the test. In affirming the judgment, the appellate court held that this lie detector test was inadmissible because it had not yet gained proper standing and scientific recognition to justify admitting such expert testimony.¹³²

The court relied neither on authority nor precedent in reaching its holding:¹³³

¹²⁵ Imwinkelried, *supra* note 90, at 563 (citing *Reed v. State*, 391 A.2d 364, 370 (Md. 1978)). See also *State v. Superior Court*, 718 P.2d at 178.

¹²⁶ *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 951 F.2d 1128, 1130 (9th Cir. 1991), *vacated and remanded*, 113 S. Ct. 2786 (1993) (quoting *United States v. Amaral*, 488 F.2d 1148, 1152 (9th Cir. 1973)). See also *United States v. Addison*, 498 F.2d 741, 744 (D.C. Cir. 1974) (noting jurors often impute a mystic infallibility to scientific testimony).

¹²⁷ MCCORMICK ON EVIDENCE, *supra* note 91, at § 203.

¹²⁸ See, e.g., *United States v. Marshall*, 526 F.2d 1349 (9th Cir. 1975); *United States v. Bruno*, 333 F. Supp. 570 (E.D. Pa. 1970); *People v. Wochnick*, 219 P.2d 70, 72 (Cal. Ct. App. 1950), *cert. denied*, 342 U.S. 888 (1951); *Reed v. State*, 391 A.2d 364, 368 (Md. 1978); *Henderson v. State*, 230 P.2d 495, 502-05 (Okla. Crim. App. 1951), *cert. denied*, 342 U.S. 898 (1951) (*cited in* Paul C. Giannelli, *The Admissibility of Novel Scientific Evidence: Frye v. United States, a Half Century Later*, 80 COLUM. L. REV. 1197, 1206 nn. 54-55 (1980)); *State v. Bohner*, 246 N.W. 314, 317 (Wis. 1933).

¹²⁹ Imwinkelried, *supra* note 90, at 556.

¹³⁰ 293 F. 1013 (D.C. Cir. 1923).

¹³¹ The blood pressure deception test was the forerunner of today's polygraph test.

¹³² *Frye*, 293 F. at 1013-14.

¹³³ Paul C. Giannelli, *The Admissibility of Novel Scientific Evidence: Frye v. United States, a Half-Century Later*, 80 COLUM. L. REV. 1197, 1205 (1980).

Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential force of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.¹³⁴

According to *Frye*, a novel technique must pass through an "experimental" stage in which it is scrutinized by the scientific community.¹³⁵ It is not enough that qualified experts ensure the validity of a scientific technique; the technique must also gain general acceptance within the relevant scientific community.¹³⁶ This requirement purports to guarantee that the general validity of a scientific technique will be evaluated and agreed upon by those most qualified to assess the method.¹³⁷

Some commentators view the "general acceptance" standard as overly strict¹³⁸ because gaining general acceptance takes a great deal of time. If the relevant scientific community is viewed with particularity, a new scientific technique could be accepted through the opinions of only a few experts,¹³⁹ thus departing from the true nature of the *Frye* standard.¹⁴⁰ On the other hand, if the relevant scientific community is interpreted broadly, the *Frye* test can be a rigorous barrier to admissibility. Requiring any sizable group to formally accept the test will produce "cultural lag"¹⁴¹ as courts will inevitably trail modern science.¹⁴²

B. THE RELEVANCY TEST

Poignant criticisms of *Frye* have led Professor McCormick and others to advocate the second standard, a "relevancy approach."¹⁴³

¹³⁴ *Frye*, 293 F. at 1014.

¹³⁵ *Id.*

¹³⁶ Only after the scientific technique has passed to the demonstrable stage will it receive judicial notice. *State v. Superior Court ex rel. County of Cochise* (Blake), 718 P.2d 171, 178-79 (Ariz. 1986). See also *Daubert v. Merrell Dow Pharmaceuticals Inc.*, 951 F.2d 1128, 1129 (9th Cir. 1991), *vacated and remanded*, 113 S. Ct. 2786 (1993).

¹³⁷ *United States v. Addison*, 498 F.2d 741, 744 (D.C. Cir. 1974).

¹³⁸ See M. Thaddeus Murphy, Comment, *The Admissibility of Scientific Evidence in Illinois*, 21 *Loy. U. Chi. L.J.* 935, 940 (1990).

¹³⁹ *Id.*

¹⁴⁰ Giannelli, *supra* note 133, at 1209-10.

¹⁴¹ See J. Alexander Tanford et al., *Novel Scientific Evidence of Intoxication: Acoustic Analysis of Voice Recordings From The Exxon Valdez*, 82 *J. CRIM. L. & CRIMINOLOGY* 579, 593 (1992).

¹⁴² See Murphy, *supra* note 138, at 943.

¹⁴³ See Giannelli, *supra* note 133, at 1233 (citing C. McCORMICK, *EVIDENCE* 363-64 (1954)).

This rule would admit any expert testimony “deemed helpful and germane to the scientific issue before the court.”¹⁴⁴ Specifically, Rule 702 of the Federal Rules of Evidence states that “[i]f scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise.”¹⁴⁵

Aspects of relevancy include the validity of the underlying principle, and the validity and application of the technique applying the principle.¹⁴⁶ For example, a court should consider

the ‘novelty’¹⁴⁷ of the new technique, the existence of specialized literature dealing with it, the qualifications and professional stature of expert witnesses, the frequency with which a technique leads to erroneous results and the type of error generated, and whether expert testimony has been offered in earlier cases to support or dispute its merits.¹⁴⁸

C. THE *DAUBERT* TEST

In 1993, the Supreme Court changed the longstanding reliance on the *Frye* test when it asserted in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*¹⁴⁹ that the Federal Rules of Evidence superseded *Frye*. *Daubert* ended the disagreement among the lower federal courts over whether HGN evidence should be held to *Frye*’s “general acceptance” standard, or to the Federal Rules of Evidence’s more liberal “relevancy” approach.¹⁵⁰

Daubert was a summary judgment case in which infants and their

¹⁴⁴ Peter Huber, *Junk Science in the Courtroom*, 26 VAL. U. L. REV. 722, 732 (1992). Rule 702 of the Federal Rules of Evidence has been called the “helpfulness test” because relevant testimony helps the trier of fact. JACK B. WEINSTEIN & MARGARET A. BERGER, WEINSTEIN’S EVIDENCE MANUAL ¶ 13.02[01] (1991).

¹⁴⁵ FED. R. EVID. 702. Many states have adopted a similar rule. See IOWA R. EVID. 702 (quoted in *State v. Murphy*, 451 N.W.2d 154, 156 n.1 (Iowa 1990)); IDAHO R. EVID. 702 (quoted in *State v. Gleason*, 844 P.2d 691, 694 n.1 (Idaho 1992)); MONT. R. EVID. 702 (quoted in *State v. Clark*, 762 P.2d 853, 856 (Mont. 1988)).

¹⁴⁶ Giannelli, *supra* note 133, at 1200-01.

¹⁴⁷ Novel scientific evidence rests on a scientific hypothesis that has not previously been accorded judicial recognition as an appropriate basis for expert testimony. WEINSTEIN & BERGER, *supra* note 144, at ¶ 13.02[04].

¹⁴⁸ Essen & Levenstein, *supra* note 3, at 7-8 (quoting *United States v. Downing*, 753 F.2d 1224, 1238-39 (3d Cir. 1985) (holding that testimony concerning the reliability of eyewitness identification by an expert in human perception and memory was admissible)).

¹⁴⁹ 113 S. Ct. 2786 (1993).

¹⁵⁰ Because many state courts have yet to abandon *Frye* and adopt *Daubert*, the *Frye* test remains important, if no longer universal.

guardians *ad litem* sued Merrell Dow to recover for birth defects allegedly caused by their mother's use of Bendectin, an anti-nausea drug.¹⁵¹ The issue before the lower courts was whether reanalysis was a generally accepted scientific technique that should pass the *Frye* test. The District Court held, and the Court of Appeals affirmed, that the test did not comply with the *Frye* standard of general acceptance because re-analysis in question was not verified and scrutinized by others in the field.¹⁵²

The Supreme Court vacated and remanded this case.¹⁵³ Calling the *Frye* standard "austere", the Court stated that it should not be applied in federal trials, as nothing in Rule 702 establishes general acceptance as an absolute prerequisite to admissibility.¹⁵⁴ Although it may at first appear that *Daubert* has definitively established a clear and concise rule, on a more careful reading, it becomes apparent that the Court has done somewhat less.

On one hand, the Court did state that even though the *Frye* test was displaced by the Federal Rules of Evidence, it did not mean that the Rules placed no limits on the admissibility of scientific evidence.¹⁵⁵ The trial judge must determine whether the subject of an expert's testimony is "scientific knowledge"¹⁵⁶ and whether the testimony can be supported by appropriate validation. Moreover, there must be a valid scientific connection between the expert testimony and the pertinent inquiry.¹⁵⁷ In other words, *Daubert* asks judges to make decisions on a case by case basis.

On the other hand, perhaps the Court presumed too much when it said "[w]e are confident that federal judges possess the capacity to undertake this review,"¹⁵⁸ because such a review entails a preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid and whether it can be properly applied to the facts in issue.¹⁵⁹ It is at this point that *Daubert* loses its punch. Rather than set forth a clear standard for trial judges to follow, the majority opinion merely noted that judges have a "gatekeeping" role without explaining exactly what this role

¹⁵¹ *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 951 F.2d 1128, 1129 (9th Cir. 1991), *reversed and remanded*, 113 S. Ct. 2786 (1993).

¹⁵² *Id.* at 1129, 1131.

¹⁵³ *Daubert*, 113 S. Ct. at 2786.

¹⁵⁴ *Id.* at 2794.

¹⁵⁵ *Id.* at 2795.

¹⁵⁶ To qualify as scientific knowledge, an inference or assertion must be derived by the scientific method. *Id.*

¹⁵⁷ *Id.* at 2796.

¹⁵⁸ *Id.*

¹⁵⁹ *Id.*

entails. Chief Justice Rehnquist, in his dissent, properly recognized that the aftermath of this opinion will be "countless more questions . . . when hundreds of district judges try to apply its teaching to particular offers of expert testimony."¹⁶⁰

In relying on federal¹⁶¹ judges to assume responsibility for the quality of scientific evidence presented,¹⁶² the *Daubert* decision is to an extent, a continuation of *Frye*, albeit in modified form. The Court admitted that even though general acceptance is not a necessary precondition to the admissibility of scientific evidence, it can have a bearing on the inquiry into its reliability.¹⁶³ In fact, the Court not only acknowledged that widespread acceptance of a particular technique may be an important factor to consider in determining admissibility, but maintained that a judge may view with skepticism any method which, though known, has nonetheless failed to attract anything more than minimal support within the community.¹⁶⁴

Even under the new *Daubert* standard, a problem which has plagued scientific evidence remains: how can the court prevent the trier of fact from giving undue weight to scientific or quasi-scientific evidence,¹⁶⁵ even though not all such evidence carries with it an "aura of infallibility?"¹⁶⁶ Professor McCormick suggests a solution: if the technique is demonstrable in the courtroom, and the jury can understand its principles and procedures, the test should be admissible because experts will not "exert undue influence" over the jury.¹⁶⁷ The psychophysical roadside sobriety tests such as the walk-and-turn and one-legged stand are based on the scientific theory that an intoxicated person's inability to perform the test is related to the level of alcohol in the person's bloodstream.¹⁶⁸ These field tests receive judicial notice because they monitor common reactions to alcohol.¹⁶⁹ On the other hand, esoteric or invisible analysis (e.g.,

¹⁶⁰ *Id.* at 2800 (Rehnquist, C.J., dissenting).

¹⁶¹ Although *Daubert* applies only to federal courts, state courts will probably use it as a guideline. Natalie Angier, *Ruling on Scientific Evidence: A Just Burden*, N.Y. TIMES, June 30, 1993, at 12A.

¹⁶² The Court suggested that judges determine whether the scientific methodology was tested to see if it could be falsified; whether the theory or technique has been subjected to peer review and publication; and consider the known or potential rate of error and the existence and maintenance of standards controlling the technique's operation. *Daubert*, 113 S. Ct. at 2796-97.

¹⁶³ *Id.* at 2797.

¹⁶⁴ *Id.* (quoting *United States v. Downing*, 753 F.2d 1224, 1238 (3d. Cir. 1985)).

¹⁶⁵ Carper & McCamey, *supra* note 11, at 147.

¹⁶⁶ MCCORMICK ON EVIDENCE, *supra* note 91, at § 203.

¹⁶⁷ *Id.*

¹⁶⁸ *State v. Reed*, 732 P.2d 66, 68 (Or. 1987).

¹⁶⁹ In Oregon, judicial notice is given to the following signs of alcohol intoxication: odor of breath, flushed appearance, lack of muscular coordination, speech difficulties,

biochemical analysis) may warrant a showing of stronger probative value¹⁷⁰ because understanding the method in question wholly depends on expert testimony.¹⁷¹ HGN seems to fall in between these two types of analyses.

HGN is not known to the average person, it does have a medical link, and it is not easily recognized or understood by most people.¹⁷² Therefore, if the jury can understand that alcohol causes poor coordination, then perhaps the solution is to help the jury understand the relationship between alcohol and a less obvious physical response. To relieve HGN of its mystique, perhaps a prosecutor should give a demonstration of HGN in the courtroom to help the jury understand the procedure.

IV. *STATE V. SUPERIOR COURT EX REL COUNTY OF COCHISE* (BLAKE)¹⁷³

Not all state courts have ruled on the issue of horizontal gaze nystagmus testing and its use as scientific evidence.¹⁷⁴ In fact, state courts have only begun addressing this issue in reported opinions in the last seven years.¹⁷⁵ The Arizona Supreme Court's decision in *State v. Superior Court ex rel. County of Cochise (Blake)*¹⁷⁶ is considered the "most extensively researched and well-reasoned case dealing with the issue of admissibility of HGN tests."¹⁷⁷

In that case, the Arizona Supreme Court granted review of the admissibility of the HGN test as a matter of first impression for the court.¹⁷⁸ The defendant, Blake, was stopped by an officer who had observed his vehicle "meandering" within its lane. The officer recognized signs of intoxication from Blake's appearance and proceeded to administer a battery of six field sobriety tests. Blake's performance on the first three tests was "fair", but the HGN test established that his BAC was over 0.10%. At the station, Blake registered a BAC of 0.163% on the intoxilyzer test.¹⁷⁹

disorderly or unusual conduct, visual disorder, dizziness, nausea, muscular tremors, and mental disturbances. *Id.* at 68 n.2 (quoting *State v. Clark*, 593 P.2d 123 (Or. 1979)).

¹⁷⁰ Giannelli, *supra* note 133, at 1237. See also Tanford, *supra* note 141, at 601.

¹⁷¹ Giannelli, *supra* note 133, at 1236.

¹⁷² See *supra* note 18 and accompanying text.

¹⁷³ 718 P.2d 171 (Ariz. 1986).

¹⁷⁴ See *supra* note 12, listing states which have thus far addressed this issue.

¹⁷⁵ Up to that point cases had simply mentioned the use of the HGN test. See, e.g., *State v. McNaught*, 713 P.2d 457, 462 (Kan. 1986); *State v. Kelly*, 786 P.2d 623, 625 (Kan. Ct. App. 1990).

¹⁷⁶ 718 P.2d at 171.

¹⁷⁷ *State v. Armstrong*, 561 So. 2d 883, 886 (La. Ct. App. 1990).

¹⁷⁸ *State v. Superior Court*, 718 P.2d at 172.

¹⁷⁹ *Id.* at 173.

The defendant moved to dismiss the prosecution for lack of probable cause to arrest and to preclude admission of testimony of the HGN test and its results in trial. At the evidentiary hearing, the state called as witnesses a research psychologist who studied the effects of alcohol on behavior, two police sergeants, and the arresting officer.¹⁸⁰ The trial court held that HGN represented a new scientific principle and consequently was subject to the *Frye* standard of admissibility.¹⁸¹ The court of appeals affirmed the trial court's finding that the HGN test itself satisfied *Frye* and that the test would have been admissible except for the state's insufficient foundation regarding the arresting officer's proficiency in administering the test.¹⁸²

The Arizona Supreme Court held that the HGN test and its results satisfied the *Frye* test for admissibility of scientific evidence.¹⁸³ The court stated that "general acceptance" requires neither universal acceptance nor absolute accuracy.¹⁸⁴ To gain general accept-

¹⁸⁰ *Id.*

¹⁸¹ The trial court also held that the HGN test did not satisfy *Frye*. It deemed the test unreliable, and held that it could not form the basis of probable cause to arrest. The Court of Appeals, on the other hand, held that *Frye* only pertained to the admissibility of evidence at trial, and not to the issue of probable cause to arrest. It noted that probable cause only requires "reasonably trustworthy information sufficient to lead a reasonable person to believe an offense had been committed and the person to be arrested committed the offense." *Id.* at 174.

¹⁸² *Id.* at 174-75.

¹⁸³ *State v. Superior Court ex rel. County of Cochise (Blake)*, 718 P.2d 171 (Ariz. 1986).

The court established three other propositions. First, it stated that administering roadside sobriety tests does not require probable cause, and second, that evidence used to establish probable cause need not be tested under *Frye*. *Accord* *State v. Grier*, 791 P.2d 627, 631 n.2 (Alaska Ct. App. 1990); *State v. Royce*, 616 A.2d 284 (Conn. App. Ct. 1992); *People v. Jebelian*, 561 N.E.2d 1079 (Ill. App. Ct. 1990); *People v. Furness*, 526 N.E.2d 947 (Ill. App. Ct. 1988); *Angle v. Kan. Dep't of Revenue*, 758 P.2d 226 (Kan. Ct. App. 1988); *State v. Whiteacre*, 601 N.E.2d 691 (Bowling Green Mun. Ct. 1992).

Third, the court stated that this sort of stop did not violate the defendant's fourth amendment rights. The Fourth amendment guarantees the right to be secure against unreasonable search and seizure. This guarantee requires arrests to be based on probable cause and permits limited investigatory stops based only on an articulable reasonable suspicion of criminal activity. *See Terry v. Ohio*, 392 U.S. 1 (1968). In analyzing the constitutionality of roadside sobriety testing, the court relied on *Terry*, which stated that "where a police officer observes unusual conduct which leads him reasonably to conclude in light of his experience that criminal activity may be afoot . . . he is entitled to conduct a carefully limited search . . ." 392 U.S. at 30. As the court held that people who drive under the influence of alcohol pose a threat to public safety, the state has a compelling interest to remove drunk drivers from highways. *State v. Superior Court*, 718 P.2d at 176. If roadside tests do not involve long delays and unreasonable intrusion, these searches do not violate the Fourth Amendment. *Id.* For additional cases concerning Fourth Amendment issues, *see supra* note 61.

¹⁸⁴ *State v. Superior Court*, 718 P.2d at 181.

ance, the technique must be validated by scientists other than those who have professional and personal interest in the outcome of the evaluation.¹⁸⁵ After discussing the different professional fields that might be interested in the validity of the HGN test, the court concluded that the appropriate disciplines which comprise the relevant scientific community included behavioral psychology, highway safety and, to a lesser extent, neurology and criminalistics.¹⁸⁶

In holding that the HGN test satisfied the *Frye* test for admissibility, the court determined that several propositions had gained general acceptance in the relevant scientific community.¹⁸⁷ The court reasoned that (1) HGN occurs in conjunction with alcohol consumption; (2) its onset and distinctness are correlated to BAC; (3) BAC in excess of 0.10% can be estimated with reasonable accuracy from the combination of the eyes' tracking ability, angle of onset of nystagmus, and the degree of nystagmus at maximum deviation; and (4) officers can be trained to observe these phenomena sufficiently to estimate accurately whether BAC is above or below 0.10%.¹⁸⁸

In 1990, the Arizona Supreme Court granted review in another DUI case to clarify *State v. Superior Court* as applied to cases in which no chemical analyses of the defendant's blood, breath or urine was conducted. In *State ex rel. Hamilton v. City Court of Mesa*,¹⁸⁹ the court held that in the absence of a chemical analysis, an officer may neither testify to the accuracy of the HGN test result in estimating a person's BAC nor estimate the extent to which a suspect's BAC was above or below 0.10%.¹⁹⁰ Testimony is limited to describing the officer's education and experience and to a statement that, based on the officer's training, the officer had determined that the results of

¹⁸⁵ However, the relevant scientific acceptance is often self-selecting. The court believed that only those with actual interest in the new scientific principle would likely evaluate it. *Id.* at 179.

¹⁸⁶ Pharmacologists and ophthalmologists were not included because, although they may be concerned with the connection between alcohol and nystagmus, they are not specifically concerned with the affects of alcohol on performance of the field sobriety tests. *Id.* at 180.

¹⁸⁷ *Id.* at 181.

¹⁸⁸ *Id.* On remand, the appellate court in *State v. Superior Court ex rel. County of Cochise (Blake II)*, 718 P.2d 189 (Ariz. Ct. App. 1986), held the foundation for admitting HGN evidence is established by showing that the officer has been certified, that the officer has maintained his or her skill by continually working with the test, and that the officer maintained an 80% proficiency rate. That the court did not specify what frequency constituted "continually" has troubled the Arizona courts and other jurisdictions as well. See *State v. Superior Court (Blake II)*, 718 P.2d at 192; Lusk, *supra* note 43, at 28.

¹⁸⁹ 799 P.2d 855 (Ariz. 1990).

¹⁹⁰ *Id.* at 858. See also *State v. Ricke*, 778 P.2d 1358 (Ariz. Ct. App. 1989).

the HGN test "indicated a neurological impairment, one cause of which could be alcohol ingestion."¹⁹¹

The court reasoned that although reporting HGN test results which indicate a BAC in excess of 0.10% may be relevant to a DUI charge, its potential to confuse and unduly influence the jury outweighed its probative value.¹⁹² Moreover, the court repeated its warning in *State v. Superior Court* that using the HGN test to quantify intoxication in lieu of available chemical devices raises due process problems.¹⁹³

V. POST-STATE V. SUPERIOR COURT ANALYSIS

State v. Superior Court has proven to be a precedent-setting case, relied upon by almost every jurisdiction faced with this issue. The weight given to its holding by other courts depends upon factors such as whether or not the state follows *Frye*,¹⁹⁴ and whether or not it actually considers the HGN test "scientific." These decisions indicate that the HGN test still faces a considerable degree of confusion and uncertainty and that the status of an examining officer's testimony is questionable.

Cases examining the admissibility of HGN tests can be understood in the context of a continuum, beginning with the creation of a theory and ending where the theory receives judicial notice. This section will thus briefly outline a six-stage process for the admissi-

¹⁹¹ *Hamilton*, 799 P.2d at 858. See also *State v. Albrecht*, 811 P.2d 791 (Ariz. Ct. App. 1991).

¹⁹² *Hamilton*, 799 P.2d at 859.

¹⁹³ *Id.* at 858 (quoting *State v. Superior Court ex rel. County of Cochise (Blake)*, 718 P.2d 171, 181 (Ariz. 1986)).

Embodied in due process is the concept of basic rights of the defendant in criminal proceedings, and requisites for a fair trial. The defendant is thereby denied due process if any question of fact is conclusively presumed against him. See BLACK'S LAW DICTIONARY 500-01 (6th ed. 1990). See also *McClellan v. Moran*, 963 F.2d 1306, 1308 (9th Cir. 1992) (citing *County Court v. Allen*, 442 U.S. 140, 156 (1979)). According to *State v. Superior Court* and *Hamilton*, a defendant would be denied due process because an arresting officer's "reading" of the HGN test at roadside could not be verified or duplicated by an independent party. "[A]lthough it carries a scientific patina, [the HGN test] is clearly unchallengeable by independent means, other than by cross-examining the officer who administered the test." *State ex rel. Hamilton v. City Court of Mesa*, 799 P.2d 855, 858 (Ariz. 1990).

¹⁹⁴ The *Frye* standard is meant to insure that the validity of a scientific theory is critically evaluated by experts; to promote a degree of uniformity of decision; to avoid the cost and confusion of assessing the reliability of a scientific technique at trial; to insure that when the technique is introduced, it will not only be reliable and relevant, but will not unduly influence the trier of fact who cannot accurately evaluate its reliability; and to impose a threshold standard of reliability, as it is unlikely that the trier of fact will effectively learn of the technique's inaccuracies through cross-examination. MICHAEL H. GRAHAM, HANDBOOK OF FEDERAL EVIDENCE § 703.2 (3d ed. 1991).

bility of scientific evidence.¹⁹⁵ Within this framework a logical progression of judicial acceptance can be identified, thereby illuminating the points at which courts have been in dispute over the use of horizontal gaze nystagmus in the courtroom. This section will conclude by speculating as to what may happen if state courts choose to follow the Supreme Court's decision regarding Rule 702's relevancy standard as posited in *Daubert*.¹⁹⁶

Professor Andre Moenssens lists six identifiable stages in bringing a novel technique from concept to evidence:

Stage 1: A theory is postulated.

Stage 2: Experiments are designed to verify the validity of the theory.

Stage 3: If the theory's validity is not disproven after searching inquiry and empirical testing, it is "proven" valid and the court may take judicial notice of the theory.¹⁹⁷

Stage 4: A technique is devised, or an instrument is designed and built, that will permit the theory to be applied practically in a forensic setting.

Stage 5: After devising a methodology, further tests must demonstrate a positive correlation between the results and the underlying theory. This is necessary to prove that the effects observed are not the results of some unidentified cause.

Stage 6: After the test has been shown to yield reliable results that are relevant to disputed issues in a law suit, a court then may admit these results properly into evidence, and a qualified expert may interpret the results before the jury.¹⁹⁸

Although specific details and circumstances distinguish each of the post-*State v. Superior Court* cases, the facts are relatively similar. For the purpose of this discussion, this comment will assume the following scenario: The police stop a suspect's vehicle because of erratic driving. The suspect claims that he only had one or two beers, or blames his driving on other factors, such as prescription medicine or unfamiliarity with the car. The examining officer administers three field-sobriety tests¹⁹⁹ and records the results which indicate intoxication. The suspect is brought to the station where he registers a BAC above 0.10% on the breathalyzer test. He is arrested for DUI and the case is brought to trial.²⁰⁰

At trial the state introduces evidence that he was driving under

¹⁹⁵ See MOENSSENS ET AL., *supra* note 90, at § 1.03; Andre A. Moenssens, *Admissibility of Scientific Evidence; An Alternative to Frye*, 25 WM. & MARY L. REV. 545, 556 (1984).

¹⁹⁶ *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 113 S. Ct. 2786 (1993).

¹⁹⁷ Moenssens notes that this is unlikely because at this stage there is no effective way to translate the theory into relevant evidence.

¹⁹⁸ Moenssens, *supra* note 195, at 556.

¹⁹⁹ According to the NHTSA's 1984 manual, the three tests will be the walk-and-turn test, the one-leg stand test, and the HGN test. See *supra* notes 1 & 8.

²⁰⁰ See, e.g., *State v. Witte*, 836 P.2d 1110, 1112 (Kan. 1992).

the influence of alcohol. The technician who analyzed the chemical test testifies to the blood alcohol content of the sample, and the officer who pulled the defendant over testifies to his number of years as an officer and to the extent of his training in the detection of intoxicated persons, including advance training in HGN testing.²⁰¹ The officer testifies that field sobriety tests are routinely administered to drivers suspected of driving under the influence of alcohol, unless the driver is physically unable or refuses to undergo such tests.²⁰² When the officer is asked to describe what the HGN test is, defense counsel objects that either the officer lacks the medical background and expertise required to answer this question,²⁰³ or that the HGN test has not reached a level of verifiable certainty and acceptance by the scientific community for the purposes used in the case.²⁰⁴ The court then decides whether or not to allow such testimony into evidence.

A. STAGES ONE TO THREE: THEORY IS POSTULATED AND EXPERIMENTS ARE PERFORMED TO PROVE VALIDITY OF THEORY

The HGN test has passed through stages one, two and three, and courts dispute its validity at the other three stages. Yet, before contrasting the responses of different courts to this issue, it is necessary to have at least a brief understanding of the progression of the HGN test from theory (stages one, two and three) into technique (stage four) in order to see how courts have arrived at the latter stages.

The correlation between alcohol intoxication and nystagmus had been examined for years within the scientific community. These studies, however, had nothing to do with DUI and police enforcement. Rather, they were controlled experiments that enabled doctors and researchers to study the effects of alcohol on the oculomotor system.²⁰⁵ Researchers postulated that nystagmus appeared after a period of alcohol consumption, being more pro-

²⁰¹ See, e.g., *Emerson v. State*, 846 S.W.2d 531, 533 (Tex. Ct. App. 1993).

²⁰² See, e.g., *In re Doe*, 844 P.2d 679, 681 (Haw. Ct. App.), cert. denied, 847 P.2d 263 (Haw. 1992).

²⁰³ See, e.g., *Emerson*, 846 S.W.2d at 532; *People v. Leahy*, 17 Cal. Rptr. 2d 359 (Cal. App. Dep't Super. Ct. 1992).

²⁰⁴ See, e.g., *Manley v. State*, 424 S.E.2d 818, 819 (Ga. Ct. App. 1992).

²⁰⁵ See Henry Murphee et al., *Effect of Congeners in Alcoholic Beverages on the Incidence of Nystagmus*, 27 Q. J. STUD. ON ALCOHOL 201 (1966); Alfred R. Fregly et al., *Relationships between Blood Alcohol, Positional Alcohol Nystagmus and Postural Equilibrium*, 28 Q. J. STUD. ON ALCOHOL 11 (1967); Umeda & Sakata, *supra* note 36.

nounced with higher levels of alcohol concentration in the bloodstream.

In 1976, Tharp, Moskowitz and Burns suggested that the HGN test would be "an excellent sobriety test for police to use."²⁰⁶ Using a controlled setting in which subjects were tested on four separate occasions at different times of night, the researchers reported a "highly significant correlation" ($r = -0.76$) between the angle of onset of HGN and a person's blood alcohol content. Research into the development of the roadside psychophysical tests resulted in the theory that the HGN test could assist police officers in the screening of DUI suspects.²⁰⁷ Thus, other experiments, both controlled laboratory tests and field tests, were designed to further verify the validity of this theory.

The NHTSA began to look seriously at the potential of nystagmus as a roadside detection device.²⁰⁸ After experimentation, researchers reported that police officers who use the HGN test could judge whether the driver's BAC was above or below 0.10%.²⁰⁹ However, the results indicated that its use as a totally reliable predictor of blood alcohol level was questionable.²¹⁰ In any event, for this theory to be put into practice, a technique was needed to standardize testing and make the HGN test an effective tool for spotting intoxicated drivers.

B. STAGE FOUR: THEORY TRANSLATED INTO TECHNIQUE SO THAT THE THEORY MAY BE APPLIED IN A FORENSIC SETTING

Relying on the premise that alcohol effects the automatic tracking mechanisms of the eyes,²¹¹ the NHTSA created guidelines for officers in administering field sobriety tests.²¹² It required officers to follow specific procedures in order to reach anticipated observations. It is at this point that the aforementioned scenario is first analyzed by some courts. The police officer in the hypothetical case followed the procedures for administering all recommended roadside tests, concluded that the driver was intoxicated and arrested the driver for DUI. At trial the officer simply testifies to all the visual indicators that made him deduce that the defendant was intoxicated.

²⁰⁶ V.K. Tharp et al., *Abstracts of Papers Presented at the 20th Annual Meeting of the Society for Psychophysical Research, Circadian Effects on Alcohol Gaze Nystagmus*, 18 *PSYCHOPHYSIOLOGY* 193 (1981).

²⁰⁷ See Carper & McCamey, *supra* note 11, at 147.

²⁰⁸ See Seelmeyer, *supra* note 1, at 29.

²⁰⁹ *Id.*

²¹⁰ See Norris, *supra* note 79, at 476.

²¹¹ Tenney, *supra* note 5, at 180.

²¹² See NHTSA DOT HS-806-512, *supra* note 8.

In doing so, the officer treats the HGN test the same as the psychophysical tests.

Moenssens criticizes some courts for allowing opinion testimony to be admitted after only the fourth stage has been satisfied.²¹³ Yet, the courts acted precisely in this manner in *State v. Bresson*²¹⁴ and *State v. Murphy*.²¹⁵ Not only did the courts in these cases admit the evidence, but they held that the results of the HGN test could be admitted as pure opinion testimony as well.²¹⁶

In *Bresson*, for example, the Ohio Supreme Court ruled that "HGN cannot be compared to other scientific tests, such as the polygraph examination, since no special equipment is required in its administration."²¹⁷ Rather, the results of the HGN test are no different than any other field-sobriety test.²¹⁸ Similarly, the Iowa Supreme Court maintained that "a lay witness may express an opinion regarding another person's sobriety, provided the witness has had an opportunity to observe the other person."²¹⁹ Therefore, it made no sense to limit the admissibility of such evidence just because the witness was trained to recognize the characteristics of intoxication. Thus, the HGN test was admitted without relying on expert opinion, as any witness may simply testify to personal observation.²²⁰

This proposal seems problematic for two reasons. First, these courts have reasoned that "[b]ecause the test may be easily administered and its results objectively recorded by a properly trained officer, it is unnecessary to establish the foundation for such evidence through scientific testimony."²²¹ It seemed to be sufficient that the officer revealed he was instructed on the use of the HGN test as part of his training.²²² However, the results are not necessarily easily understood just because a test is easily administered and observed. While many people can understand the connection between the ingestion of alcohol and the body's inability to maintain balance, few can claim similar knowledge as to the effects of alcohol on the

²¹³ See MOENSSENS ET AL., *supra* note 90, at § 1.03.

²¹⁴ 554 N.E.2d 1330 (Ohio 1990).

²¹⁵ 451 N.W.2d 154 (Iowa 1990).

²¹⁶ *Bresson*, 554 N.E.2d at 1336; *Murphy*, 451 N.W.2d at 156.

²¹⁷ *Bresson*, 554 N.E.2d at 1336.

²¹⁸ *Id.*

²¹⁹ *Murphy*, 451 N.W.2d at 155 (quoting *State v. Davis*, 196 N.W.2d 885, 893 (Iowa 1972)).

²²⁰ *Id.* See also *Lancaster v. State*, 772 S.W.2d 137, 139 (Tex. Ct. App. 1988); *People v. Loomis*, 203 Cal. Rptr. 767, 769 (Cal. Ct. App. 1984).

²²¹ *State v. Edman*, 452 N.W.2d 169, 170 (Iowa 1990) (citing *Murphy*, 451 N.W.2d at 156).

²²² *Id.*

eyes.²²³

Second, these courts are misguided in determining that HGN is objective in nature.²²⁴ The key to success regarding the HGN test is the ability to accurately assess a forty-five degree angle and differentiate between HGN and various other eye movements.²²⁵ The "proof" of intoxication therefore merely amounts to various opinions. No physical sample remains for future verification.

Admitting the HGN test as evidence at this stage not only has the effect of disregarding the purpose of *Frye* (to ensure the validity of a scientific technique through general acceptance within the relevant scientific community),²²⁶ but also proves inadequate if state courts in the future opt to follow *Daubert* and its interpretation of the relevancy approach.

The Supreme Court in *Daubert* commented that a judge must be satisfied that the quality of evidence presented is sound before it may be admitted in the courtroom. A court should consider, among other things, a technique's rate of error and whether the methodology could be falsified.²²⁷ Thus, admitting opinion testimony because it is relevant to an issue in the case without regard for the reliability of the underlying scientific principles is rather precarious.

This is evident in *State v. Clark*,²²⁸ a case in which the Montana Supreme Court addressed the issue of opinion testimony in relation to the "helpfulness" rule as set forth in Rule 702 of the Montana Rules of Evidence.²²⁹ The court concluded that the foundation requirement for expert testimony had been liberalized by Rule 702, thus permitting the admission of HGN evidence.²³⁰ In fact, the court held:

[u]nless an exaggerated popular opinion of the accuracy of the particular technique makes its use prejudicial or likely to mislead the jury, the better approach is to admit all relevant scientific evidence in the same manner as other expert testimony and allow its weight to be attacked by cross-examination or refutation.²³¹

This reasoning is misguided, as the court's sole criteria for admissi-

²²³ See *supra* note 18 and accompanying text.

²²⁴ See, e.g., *State v. Nagel*, 506 N.E.2d 285 (Ohio Ct. App. 1986) (HGN is objective in nature and thus relevant to the defendant's physical condition).

²²⁵ See *supra* notes 31-34 and accompanying text.

²²⁶ See *supra* note 136 and accompanying text.

²²⁷ *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 113 S. Ct. 2786, 2796 (1993).

²²⁸ 762 P.2d 853 (Mont. 1988).

²²⁹ *Id.* Rule 702 of the Montana Rules of Evidence is linguistically identical to Rule 702 of the Federal Rules of Evidence. See *supra* note 145 and accompanying text.

²³⁰ *State v. Witte*, 836 P.2d 1110, 1114 (Kan. 1992) (discussing *Clark*, 762 P.2d at 853).

²³¹ *Id.* at 856.

bility of scientific evidence is whether the evidence is relevant to the case.²³² Such logic creates the opportunity for one person's simplistic and plain language theory to be admitted into evidence even though it may be unreliable and faulty.²³³

Regardless of whether the *Frye* test or relevancy test is followed, allowing officers to offer opinion testimony about their observations of the HGN test at this stage is inappropriate. In a trial, often only the prosecution will call an expert witness.²³⁴ If the witness is the arresting police officer, not only does this witness have a strong bias towards conviction, but his testimony will predictably advocate the reliability of the HGN test without discussing its inadequacies.²³⁵ An unsophisticated jury would accept the results as intoxication without further explanation.²³⁶

Moreover, it is the defense attorney's job to raise doubts about the reliability of a technique. Although a good defense attorney should be properly prepared to call his own expert or to at least thoroughly research the HGN test, it is possible that the attorney may not know about the inaccuracies of the HGN test, thereby failing to make an effective cross-examination. Especially if the technique is novel, it is not unreasonable that a defendant's attorney may be unaware of existing critical literature. Thus, the costs to a first time offender under such liberal standards outweigh the benefits of such a standard.

C. STAGE FIVE: TECHNIQUE TESTED TO DEMONSTRATE A POSITIVE CORRELATION BETWEEN RESULTS AND UNDERLYING THEORY

Whereas courts who focus on issues at stage four are lenient in admitting opinion testimony, stage five seems to tighten admissibility requirements. In this stage, an expert witness must understand the connection between alcohol and the observed eye responses.

²³² The relevancy test allows admission of scientific evidence that can materially affect a case by making the existence of any fact that is of consequence more or less probable than it would be without the evidence. FED. R. EVID. 401. Further, Rule 403 merely qualifies relevancy insofar as the evidence or testimony cannot be prejudicial or confusing. Specifically, Rule 403 states that "all relevant evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury, or by considerations of undue delay, waste of time, or needless presentation of cumulative evidence." FED. R. EVID. 403.

²³³ See, e.g., Huber, *supra* note 144, at 742-48 (arguing that expert witnesses must be limited in their ability to "engage in purely personal, idiosyncratic speculation").

²³⁴ MOENSSSENS ET AL., *supra* note 90, at § 1.03. This pertains to cases in which the defendant is charged with DUI. It does not address cases in which the defendant is charged with a more serious crime such as vehicular manslaughter.

²³⁵ Moenssens, *supra* note 195, at 557.

²³⁶ State v. Clark, 762 P.2d 853, 857 (Mont. 1988) (Sheehy, J., concurring).

“Evidence of a test result cannot be characterized as ‘scientific’ or qualify as ‘technical or other specialized knowledge,’ and thus [be admissible], unless and until it is established that the test result demonstrates what it is claimed to demonstrate.”²³⁷

This requirement has the effect of limiting testimony to only those experts who profess to have a background in either science or medicine.²³⁸ For example, an Oregon Appellate Court held that an officer was not qualified to testify as an expert when he knew nothing of the bio-physiological basis of the test and did not know whether alcohol was the only cause of the eye-jerking.²³⁹ It appears that this policy would serve to exclude a lot of worthy evidence because, even though an officer could be an expert in administering the test, he may not be able to meet the criteria to comment on the reliability of its relationship to alcohol.²⁴⁰

D. STAGE SIX: TECHNIQUE GENERALLY ACCEPTED AFTER SHOWING TEST YIELDS RELIABLE RESULTS RELATING TO DISPUTED ISSUE

Finally, stage six assumes that the technique will be admissible under *Daubert* or under *Frye* in states which continue to follow that rule. In this stage, the HGN test is distinguished from the other field-sobriety tests in that its legitimacy is established through science, rather than common knowledge.²⁴¹ *Daubert* is satisfied if the trial judge determines that the evidence is scientific in nature and that a relevant connection exists between the testimony and the pertinent inquiry.²⁴² In *Frye* jurisdictions, the evidence is admissible as long as a proper foundation is established. To demonstrate a proper foundation, an officer must show that he is trained in the particular procedure, that he is certified in the administration of the procedure, and that the procedure was properly administered.²⁴³

²³⁷ State v. Borchardt, 395 N.W.2d 551, 559 (Neb. 1986).

²³⁸ *Id.*; State v. Reed, 732 P.2d 66, 69 (Or. Ct. App. 1987).

²³⁹ Reed, 732 P.2d at 69.

²⁴⁰ *Id.* See also People v. Williams, 5 Cal. Rptr. 2d 130, 135 (Cal. Ct. App. 1992).

²⁴¹ State v. Superior Court *ex rel.* County of Cochise (Blake), 718 P.2d 171 (Ariz. 1986); State v. Garrett, 811 P.2d 488 (Idaho 1991).

²⁴² See *supra* notes 156-57 and accompanying text.

²⁴³ Buening v. Illinois, 592 N.E.2d 1222, 1227 (Ill. App. Ct. 1992). See, e.g., Desselte v. State, 596 So. 2d 602 (Ala. Crim. App. 1992); Brunson v. State, 580 So. 2d 62 (Ala. Crim. App. 1991); Malone v. City of Silverhill, 575 So. 2d 101 (Ala. Crim. App.), *rev'd*, 575 So. 2d 106 (Ala. 1990) (erroneous to admit HGN test results without laying proper foundation); State *ex rel.* Hamilton v. City Court of Mesa, 799 P.2d 855 (Ariz. 1990); State *ex rel.* McDougall v. Albrecht, 811 P.2d 791 (Ariz. Ct. App. 1991); Brown v. State, 827 S.W.2d 174 (Ark. Ct. App. 1992); People v. Ojeda, 275 Cal. Rptr. 472 (Cal. Ct. App. 1990); Borden v. Voshell, No. Civ. A 91A-04-001, 1992 WL 51868 (Del. Super. Ct. Mar.

These requirements are faulty in one respect: the level of competency among the officers who administer the test is wide-ranging. The NHTSA manual defines the "well-trained technician" as an individual who studies and properly adheres to the NHTSA manuals.²⁴⁴ In all probability, not every officer would meet this standard. Therefore, this comment suggests that certification for administering the HGN test should not only guarantee that the officer will know how to administer the test and know what to look for, but that the officer will know that there are many other causes of HGN other than alcohol.²⁴⁵ The officer then could at least make a simple connection between alcohol and the effects on eye movement.²⁴⁶ With such knowledge, the officer could be required to question a suspect about his or her medical condition before administering the HGN test. The officer could carry a check-off card with relevant information to remember the requisite steps. Such an approach would be inexpensive and easy to implement.²⁴⁷

Ensuring that a police officer is properly qualified, however, does not necessarily eliminate all the difficulties that prosecutors face with this type of evidence. As there is no intuitive relationship between intoxication and eye "jerking,"²⁴⁸ reliability of the HGN test must be illustrated through testimony of expert witnesses and relevant articles and scholarly publications.²⁴⁹ Prosecutors must be able to present this evidence in such a way that the trier of fact may easily discern that this test does in fact reveal the presence of intoxication.²⁵⁰

E. CONCLUSION

The policy championed in stage six is the best proposal used thus far because it acknowledges the strengths and weaknesses of the HGN test and attempts to balance those factors. As previously stated, evidence admissible at stage six will meet the *Frye* standard

11, 1992); *State v. Garrett*, 811 P.2d 488 (Idaho 1990); *State v. Witte*, 836 P.2d 1110 (Kan. 1992); *State v. Garris*, 603 So. 2d 277 (La. Ct. App. 1992); *State v. Armstrong*, 561 So. 2d 883, 887 (La. Ct. App. 1990); *People v. Erickson*, 549 N.Y.S.2d 182 (N.Y. 1989).

²⁴⁴ See, e.g., NHTSA DOT HS-806-512, *supra* note 8, at 1.

²⁴⁵ See *supra* notes 79-88 and accompanying text.

²⁴⁶ See Rouleau, *supra* note 14, at 469-89.

²⁴⁷ The West Virginia Supreme Court articulated another interesting proposal—requiring *in camera* disclosure of methodology, scientific reliability, results of the HGN test, and evidence of whether procedures were followed by qualified personnel. *State v. Clawson*, 270 S.E.2d 659, 678 (W. Va. 1981) (*quoted in State v. Barker*, 366 S.E.2d 642, 646 (W. Va. Ct. App. 1988)).

²⁴⁸ See *Commonwealth v. Miller*, 532 A.2d 1186, 1188 (Pa. Super. Ct. 1987).

²⁴⁹ See *Barker*, 366 S.E.2d at 646. See also *Clausen*, 270 S.E.2d at 678.

²⁵⁰ *State v. Borchardt*, 395 N.W.2d 551, 559 (Neb. 1986).

for admissibility. Also, under *Daubert's* interpretation of Rule 702, scientific evidence is likewise admissible. In fact, as Rule 702 advocates a more liberal standard of admissibility, courts would have the opportunity to admit HGN testimony at the optimal point on the continuum of the six stage process for admitting scientific evidence.

It is between stages five and six that a methodology has been tested to demonstrate its reliability and underlying scientific validity, but need not have satisfied all the foundational requirements as set forth in *State v. Superior Court*.²⁵¹ In adhering to *Frye*, that case determined which professional fields constituted the relevant scientific community and which of its propositions regarding the HGN test had gained general acceptance within that circle.²⁵² If state courts are persuaded by the logic in *Daubert*, they may continue to rely on *State v. Superior Court*, but may do so in a more relaxed manner.

According to *Daubert*, the trial judge is the gatekeeper who must ascertain whether testimony is, indeed, scientific knowledge. There is no need for a consensus among experts. Agreement among a few specialists may be sufficient to show that the HGN test is reliable. The judge alone determines what criteria will be used to make such an assessment. Therefore, it is likely that testimony about the HGN test will be more readily admitted under a "helpfulness" test than under *Frye*.

Yet, as the HGN test is extremely subjective, even a legal standard aimed at regulating the admittance of scientific evidence may not be enough to contain the HGN test's "aura of infallibility." Accordingly, this comment suggests that the results of the HGN test should not comprise the main evidence presented against a defendant. As the officers have a strong bias towards conviction, they are quite convincing witnesses.²⁵³ Juries are easily persuaded by them, and defense attorneys may not have enough knowledge about HGN to properly attack the test. With the psychophysical tests, the subject often knows when he is failing a test because he can see himself fall down, or hear himself miscount numbers or slur words. With the HGN test, a suspect cannot see his own eyes jerk or twitch. There is no way to repeat the test, much less obtain a second opinion by the suspect's own expert. Therefore, judges should also provide warnings to jurors, in the form of jury instructions, about relying solely on HGN tests to find a person guilty of driving under the influence of alcohol.

²⁵¹ *State v. Superior Court ex rel. the County of Cochise (Blake)*, 718 P.2d 171 (Ariz. 1986).

²⁵² *Id.* at 180; see also notes 185-86 and accompanying text.

²⁵³ Moenssens, *supra* note 195, at 557.

VI. PROPOSAL

Ideally, the final stage that a technique should achieve is that of judicial notice²⁵⁴ of its underlying fact.²⁵⁵ In this case, the adjudicative fact is that a forty-five degree angle on onset of HGN indicates that a person has a BAC of 0.10%. If this fact were to be generally received by the relevant scientific community, the validity of the principle could then be assumed in subsequent litigation.²⁵⁶ This means that the parties would not have to spend time explaining how alcohol affects eye movement and how studies concluded that a forty-five degree angle indicates the possibility of a BAC level of 0.10%. The fact could simply be stated and the case could progress without delay. In criminal cases, however, judicial notice is analogous to a presumption; a fact cannot be judicially noticed that does not leave the jury "free not to find the presumed fact even though the basic fact is established beyond a reasonable doubt."²⁵⁷ With courts presently unable to adequately deal with HGN, and the amount of literature criticizing the correlation between HGN and BAC, judicial notice for this fact is unlikely anytime soon.

This comment advocates the admittance of HGN evidence in the courtroom, provided that the jury be expressly cautioned about the test. This comment proposes a jury instruction that not only reflects the best aspects of the HGN test, but also mentions the test's limits, difficulties, and circumstances for unreliability. This instruction would enable both parties to put forth their most persuasive cases and allow the court to remind the trier of fact that the evidence is by no means irrefutable.

This jury instruction must possess two key qualities. First, the court should not reveal its own conclusions on the weight on the evidence.²⁵⁸ It should remind the jury that there are several points to consider without indicating to the jury which inferences it should draw from the evidence.²⁵⁹ Second, the jury instruction should resemble an instruction for expert testimony. Since a police officer will probably hold himself out as an expert, and the jury will regard

²⁵⁴ A judicially noticed fact must be one not subject to reasonable dispute, such that it is either (1) generally known within the territorial jurisdiction of the trial court or (2) capable of accurate and ready determination by resort to sources whose accuracy cannot reasonably be questioned. FED. R. EVID. 201(b).

²⁵⁵ Dispensing of formal proof when a matter is not really in dispute saves time, energy and money. WEINSTEIN & BERGER, *supra* note 144, at ¶ 4.02.

²⁵⁶ GRAHAM, *supra* note 194, at § 703.2; WEINSTEIN & BERGER, *supra* note 144, at ¶ 402.

²⁵⁷ WEINSTEIN & BERGER, *supra* note 144, at ¶ 4.07. See also *supra* note 193.

²⁵⁸ See WEINSTEIN & BERGER, *supra* note 144, at ¶ 2.07[02].

²⁵⁹ *Id.*

him as such, the instruction should inform the jury that it need not accept the expert's opinion.²⁶⁰

The proposed sample jury instruction would read as follows:

You have heard testimony from a person described as an expert witness. An expert witness has, through education, experience, skill or training gained special knowledge or experience that enable the expert to state an opinion on matters in that field.

The expert has provided testimony on a roadside sobriety test called the Horizontal Gaze Nystagmus Test or HGN test. This is scientific evidence and therefore the State has the burden of providing you with certain information about the HGN test and the expert who testified about it.

You do not have to accept the expert's opinion. You may accept it or reject it or give it as much weight as you think it deserves. In doing so, you should consider the witness' experience and training and the witness' qualifications as an expert in knowing about the HGN test and administering the test. You should also consider whether the procedure was properly administered.

Remember that you may consider the soundness of the reasons given for the opinion, the acceptability of the methods used, and all other evidence in the case. You alone decide how much of the witness' testimony is to be believed, and how much weight it deserves.

VII. CONCLUSION

Horizontal gaze nystagmus should be admitted in courts as scientific evidence. Although vulnerable to criticism, most notably that there are several other causes of nystagmus, the HGN test is thus far the most effective roadside procedure for determining whether a person is driving under the influence of alcohol. When the HGN test is administered in conjunction with the walk-and-turn test, a police officer can accurately classify a person as having a BAC of 0.10% 80 to 83 times out of 100. Although these tests are not conclusive, they can add immeasurable weight to a case based upon a chemical test.

The HGN test should only be admitted as evidence pursuant to the guidelines set forth in *Daubert* or *Frye*. Since HGN is scientific in nature, it conveys the "imprimatur of science," and people will often readily accept its conclusions as accurate. By refusing to admit pure opinion testimony and requiring that witnesses not only be properly trained in administering and reading the results of the HGN test, but also be capable of testifying that, indeed, the test was

²⁶⁰ See PATTERN JURY INSTRUCTION, U.S. 6TH CIRCUIT DISTRICT JUDGES ASSOCIATION (1991); MANUAL OF MODEL CRIMINAL JURY INSTRUCTIONS FOR THE 9TH CIRCUIT (1992); MANUAL OF MODEL CRIMINAL JURY INSTRUCTIONS FOR THE DISTRICT COURT OF THE 8TH CIRCUIT (1992).

accurate, the validity and/or reliability of the technique can be properly confirmed.

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