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SPECIAL TOPICS SERIES

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American
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Research Institute

Admissibility of Horizontal Gaze Nystagmus Evidence

Targeting Hardcore Impaired Drivers

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May 2003

American Prosecutors Research Institute

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Introduction: The Best Field Sobriety Test

Nothing is worse for police and prosecutors than impaired drivers who have already been through the system three or four times. These hardcore offenders have learned not to make incriminating statements or take blood alcohol tests. They even practice the standardized field sobriety tests (SFSTs) in bars before they drive home. Their heightened tolerance to alcohol and repetition of the tests often gives them an ability to display only a small number of impairment clues, but there is one SFST that cannot be practiced or physically controlled—the Horizontal Gaze Nystagmus (HGN) Test.

That is good news for police and prosecutors. The HGN test is the most accurate of all the tests, the best test for apprehending drivers between .08% and .12%, and the most researched of all the SFSTs. Experience has shown that multiple offenders may be quick to refuse the walk & turn or the one-leg stand tests, but for whatever reasons, many will submit to the HGN test.

That leaves prosecutors with the task of admitting the HGN test in court. Yet, a common refrain heard in courtrooms from defense lawyers, and sadly some judges, is that *"HGN is not admissible!"* With constant repetition, the phrase becomes conventional wisdom. Police officers even begin to say it to each other on the street and forego using a great tool in detection and apprehension. But, here's the reality: The HGN test is admissible in a majority of courtrooms in the country. While the defense bar's phrase above has a bit of truth to it, which is why it sticks, the important part is left out—"HGN is not admissible *unless the proper foundation has been laid!"*

The foundational hurdles placed before prosecutors in many jurisdictions are high, but prosecutors must be willing to fight for HGN's admissibility. The evidence is too valuable and reliable to concede territory to the defense bar.

What follows is a guide to HGN admissibility with articles from a variety of experts in the area, most notably, leading HGN researchers and authors Dr. Marcelline Burns, PhD of the Southern California Research Institute, and Dr. Karl Citek, OD, PhD, FAAO of Pacific University. Both Dr. Burns and Dr. Citek have traveled the country testifying on the issue of HGN admissibility, and here they provide their unique insight for prosecutors.

I would like to acknowledge APRI senior attorney Marcia Cunningham and prosecutors Karen Herland of Minneapolis, Minnesota and Stephen Talpins of Miami, Florida for their insightful reviews of the legal material and Mr. Talpins' account of how to apply this knowledge in court. His story is not only a wonderful synthesis of the legal and technical material presented in this publication, but he sets an example for all prosecutors as well.

John Bobo
Director, National Traffic Law Center
American Prosecutors Research Institute
May 2003

What is the HGN Test?

By Marcelline Burns, PhD, and Karl Citek, OD, PhD, FAAO.

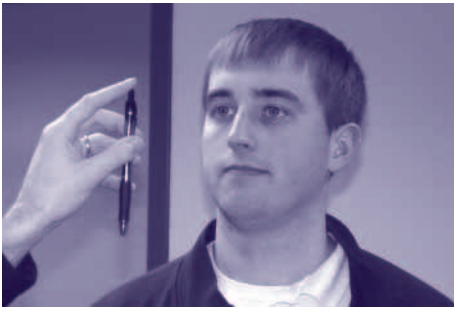
When examining an individual suspected of alcohol or drug impairment, officers frequently use the Horizontal Gaze Nystagmus (HGN) test, which is one of the three Standardized Field Sobriety Tests. An officer looks for the following HGN signs in each eye:

- Lack of smooth pursuit;
- Nystagmus at maximum deviation; and
- Onset of gaze nystagmus prior to 45 degrees.

These signs do not result from problems with the eye muscles directly. Rather, the brain and nerve centers that control the eye muscles are affected by alcohol, other central nervous system depressants, inhalants, or phencyclidine or its analogs. The signs appear in the order of testing as the level of impairment increases—i.e., at lower levels of impairment, an officer might see only lack of smooth pursuit, but at the highest levels of intoxication, all three signs will be present.

HGN observations require no specialized equipment, and all of the signs can be easily observed when the officer stands about arm's-length from the subject. With regular use, an officer quickly gains skill and confidence in administering the test and interpreting the observed signs. Most importantly, the eye movement signs are not subject to control, practice or tolerance.

Lack of smooth pursuit.
This is observed when the eye cannot track a stimulus moving at a constant speed. Short, fast eye movements, known as *saccades*, try to keep the eye on the target and appear jumpy or jerky, much like a windshield wiper dragging and catching along a dry windshield.



Nystagmus at maximum deviation. Nystagmus is an involuntary, repetitive eye movement. The eye appears to quickly bounce back and forth over a short extent. At extreme lateral gaze, also known as endpoint or maximum deviation, the nystagmus is obvious and continues for at least four seconds.

Onset of gaze nystagmus prior to 45 degrees. At an angle of gaze prior to endpoint, nystagmus is distinct and continues as the subject attempts to hold the eye at that angle.

There is a relationship between the blood alcohol concentration (BAC) and the angle of gaze at which nystagmus is first observed, such that a smaller angle (that is, closer to straight ahead) indicates greater impairment. Nonetheless, officers are asked only to determine if the angle is less than 45 degrees.

Vertical Gaze Nystagmus. Recently, the National Highway Traffic Safety Administration added the Vertical Gaze Nystagmus (VGN) test as part of the SFST protocol. This occurs at maximum deviation of the eyes upward and will be present at a BAC that is high for that individual. Note that vertical nystagmus does not occur during down-gaze, regardless of impairment level, and VGN clues are not scored as part of the HGN test.

In all cases, nystagmus should not be present when the impaired subject looks straight ahead.

HGN Clues and Scoring		
	Left Eye	Right Eye
Lack of smooth pursuit	1	1
Distinct nystagmus at maximum deviation	1	1
Onset prior to 45 degree gaze angle	1	1
Total	3	3
Maximum score	6	

The HGN test is not pass/fail. Scored clues are indicators of impairment.

Foundational Hurdles of HGN

By John Bobo, Director, APRI's National Traffic Law Center

The HGN test is admissible in a majority of courtrooms in the country if the foundational requirements of scientific validity and reliability have been met by the prosecutor.

In a perfect world, HGN foundation would require nothing more than the officer testifying to his training, certification, experience and results of the test. After all, nystagmus is nothing more than a visible, physiological sign of impairment not unlike a staggered gait or slurred speech. A small number of states, such as Iowa and Montana, have held that to be the case.

In other states, more prosecutorial elbow-grease is required. More than 36 states have controlling appellate decisions holding that the HGN test is scientific in nature, thus raising the foundational hurdles to be overcome in the name of scientific reliability and validity. Here's why: Unlike staggering or slurring speech, visible nystagmus is not common to the life experience of judges or jurors. The end result is that courts often take a simple concept and make it more difficult than it actually is.

HGN and the Law

The most common standards for handling scientific evidence are the *Frye* standard and the *Daubert / Federal Rule of Evidence 702* standard. Some states even follow a combination of these standards.

1. *FRYE*: Has the scientific test gained general acceptance in its field? To determine this, the court must a) identify the particular field or relevant scientific community, and b) hold that the scientific evidence is generally accepted in that community. See *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923).

- 16 states follow a *Frye* standard on admissibility of HGN. Remember, *Frye* applies only to evidence that is new or novel.

2. *DAUBERT/ Federal Rule of Evidence 702*: If scientific or specialized knowledge will assist the jury, an expert may testify in the form of opinion if a) the testimony is based upon sufficient facts or data, b) the testimony is the product of reliable principles and methods, and c) the witness has applied the principles and methods reliably to the facts of the case. See *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993) and *U.S. v. Eric D. Horn*, 185 F. Supp. 2d 530 (D. Maryland 2002).

   - 16 states follow a *Daubert* standard on admissibility of HGN, a more liberal standard that asks if the scientific evidence is valid and reliable.
     - *Validity*: Does a test measure what it claims to measure?
     - *Reliability*: Does the test repeatedly and consistently measure what it claims to measure?

3. *OTHER*: Some states have a combination of the two tests or have adopted their own standards regarding the admissibility of scientific evidence. Some states have not addressed the issue.

   For a complete and current state-by-state breakdown of controlling scientific standards and case law summaries, as well as other helpful publications, check out APRI's website at *www.ndaa-apri.org* and click on *NTLC – Traffic Law*:
   - *HGN Case Law Summary*
   - *HGN Frye/Daubert Chart*
   - *Horizontal Gaze Nystagmus: The Science & The Law—A Resource Guide for Judges, Prosecutors, and Law Enforcement.* This guide explains many types of nystagmus that defense attorneys often misapply. It also contains predicate questions for experts.
   - *Bibliography of HGN Studies & Articles*

Judges Serve as Gatekeeper

In reality, there is no mystery to nystagmus. You either see it or you don't, and if you see it, the person is impaired, excluding a few rare exceptions. An officer's training should permit him to testify about nystagmus, but the jury may never hear that evidence if prosecutors cannot get the HGN test past the judge.

Remember, in the role of gatekeeper, the courts must focus on reliability of the *methodology* used to reach conclusions—not the conclusions themselves.

Obviously, courts are placing a gargantuan burden on prosecutors considering their daily caseload. Despite the fact that the majority of courts allow HGN, defense attorneys may be correct when they say the HGN is not admissible because they know that *practically* speaking, it may be impossible for prosecutors to meet foundational requirements on a daily basis in the absence of adequate training. And, courts remain unsympathetic. One federal judge recently wrote that local prosecutors may lack sufficient resources to prove reliability and general acceptance, which is their burden, but that individuals charged with DUI have even fewer resources. *U.S. v. Eric D. Horn*, 185 F. Supp. 2d 530 (D. Maryland 2002). Yet, in the right case, prosecutors can lay the proper foundation and meet their burden, creating favorable case law and lessening the foundational requirements for cases that follow.

Planning the Fight

Like a chess grandmaster, prosecutors need to examine all the possible outcomes of their approach. While things may vary state to state, what follows is an overview of possible strategies and outcomes.

1. **Judicial Notice of HGN Pre-trial**: The court could rule that HGN is a….
   a. Physical observation. Officer can testify to his training and results of the test.
   b. Scientific test, but valid, reliable and commonly accepted. Officer can testify to his training and results of the test.

c. Scientific test, requiring expert foundation. Ask for an evidentiary hearing on your state's standard of allowing expert testimony, whether *Daubert, Frye* or a combination of the two.

2. **Pre-trial Motion for Admissibility**: Waiting to decide these issues during a jury trial may be too late. Pre-trial, the court could rule that HGN is a…
   a. Physical observation. Officer can testify to his training and results of the test.
   b. Scientific test, but valid, reliable and commonly accepted. Officer can testify to his training and results of the test.
   c. Scientific test, requiring expert foundation. Ask for an evidentiary hearing on your state's standard of allowing expert testimony, whether *Daubert, Frye* or other standard. Build a record!
   d. Inadmissible. Appeal the court's decision if you have a solid case and good record. Pre-trial litigation of this issue is important because most states do not allow the prosecution the right to appeal the court's evidentiary rulings after the jury returns a verdict.
3. **Foundational Skirmish at Trial**: The court could rule…
   a. Judicial notice (see above)
   b. Physical observation. Officer can testify to his training and results of the test.
   c. Scientific test, but valid, reliable and commonly accepted. Officer can testify to his training and results of the test.
   d. Scientific test, requiring expert foundation.
   e. Inadmissible. Time to fight harder with the evidence you can admit.

Who is the expert? Throughout these battles, prosecutors should be pressing the courts to decide not just admissibility and limits of the evidence, but who the experts are that can testify to HGN. Is it an officer with basic training? Or, is it an officer with heightened training and a large number of DUI arrests? If officers will not suffice, is it an eye doctor or a behavioral psychologist? Is the expert an emergency room physician or EMT? And, once the court is satisfied with the foundational requirement, do prosecutors have to leap over these same hurdles in every single case?

Best Practice for Foundation

For prosecutors, the biggest question is how to lay a foundation in a pre-trial motion hearing or at trial when the court has ruled that HGN is a scientific test requiring expert testimony. While there are as many strategies as there are attorneys, case review shows that whether your state uses *Frye, Daubert* or another standard, the following three-pronged approach may be advantageous:

1. *Validity of the test.* An expert, such as an optometrist, testifies to the effect of alcohol and drugs on the nervous system.
2. *Reliability of the test.* An expert, such as a behavioral psychologist, testifies on the research and field tests that allow the officer to make the observation.
3. *Application of the test.* The officer testifies to his training, experience and administration of the test.

After years of litigating this battle, defense attorneys have caught on to the prosecution's strategy. If prosecutors show up in court with a behavioral psychologist and an officer, the defense produces an optometrist. If the prosecutor shows up with an optometrist and the officer, the defense gets a behavioral psychologist.

Prosecutors may be able to satisfy prongs 1 and 2 above through a doctor of optometry who is well versed and learned in the studies and literature surrounding HGN. While the ultimate goal is to have courts recognize that a properly trained officer is qualified to testify to the test results and what they mean, the road to general acceptance will be paved with appellate records from hearings as outlined above.

Recruiting Experts

In some jurisdictions, the only foundational requirement may be that of a doctor. Recruit your own local optometrists for testimony in trials. Prior to trial, allow them to attend SFST training to see what officers do. Provide them contacts and transcripts of other optometrists who testify

regularly on this issue. Also supply them with HGN case studies and resource guides to prepare them. Having a local doctor on board garners a number of guilty pleas without even holding a hearing. Many defense lawyers recognize that if you have the expert, you will have the evidence in court.

Recruiting a local expert may be the single, most practical thing a local prosecutor can do. A number of experts are also available on the national level to assist if there is a likelihood of making precedent-setting case law.

HGN and the Role of the Optometrist

By Karl Citek, OD, PhD, FAAO
Pacific University College of Optometry

Whereas drivers under the influence of alcohol pose a significant threat to the public health, safety, and welfare; and

Whereas optometric scientists and the National Highway and Traffic Safety Administration have shown the Horizontal Gaze Nystagmus (HGN) test to be a scientifically valid and reliable tool for trained police officers to use in field sobriety testing; now therefore be it

Resolved that the American Optometric Association acknowledges the scientific validity and reliability of the HGN test as a field sobriety test when administered by properly trained and certified police officers; and be it further

Resolved that the American Optometric Association urges doctors of optometry to become involved as professional consultants in the use of HGN field sobriety testing.

Adopted June 1993
House of Delegates,
American Optometric
Association

Ten years have passed since the American Optometric Association adopted the resolution endorsing the Horizontal Gaze Nystagmus (HGN) test. In that time, my optometrist colleagues and I have used the resolution in numerous hearings and trials to demonstrate that the HGN test is recognized as valid and reliable. In dozens of cases, from Hawaii to

Kansas, from Massachusetts to St. Croix, courts have qualified the optometrist[1] as the relevant expert to explain the medical and scientific foundation of the HGN test, and to discuss the observations made by the officer when conducting the test.

What is Optometry?

Optometry is an independent health care profession that is concerned with diseases and disorders of the visual system, the eye and associated structures. Optometrists also diagnose systemic diseases as well as treat and manage eye conditions associated with those diseases.

Optometry has its roots in optics, psychology, and medicine. Optometrists prescribe eyeglasses, sunglasses, contact lenses, and low vision aids to help improve patients' vision. Optometrists assess how well the eyes focus and coordinate with each other to relieve patients' eye strain and reading difficulties. Optometrists perform tests of perception to evaluate patients' abilities to judge depth, distinguish details, and discriminate colors. Optometrists prescribe medications to combat conjunctivitis, ocular inflammation and glaucoma. Optometrists consult with other medical professionals and specialists to coordinate the care of patients who have conditions such as diabetes, hypertension and neurological problems. Optometrists also participate in clinical and scientific research in all areas of interest to the profession. This is by no means an all-inclusive list of the responsibilities and abilities of the optometrist, but is intended to demonstrate the scope of the profession.

Why is Optometry Relevant to the HGN Test?

The HGN test assesses different aspects of eye movements. The eye movement system includes not only the muscles that actually move the eyes within the head, but also the nerve centers that control those muscles, as well as the brain, which coordinates and integrates sensory inputs and the neurological signals.

[1] Optometrists have earned the degree of Doctor of Optometry (OD) and are known as "optometric physicians" in some states.

Optometrists routinely perform tests of the eye movement system. Even subtle problems with a patient's eye movements may result in headaches, eye strain, double vision or difficulty viewing at certain distances. While the optometric tests are not identical to the components of the HGN test, the anatomical and physiological foundations of the tests are related and well-understood.

On the other hand, the HGN test is not a "vision test," evaluating the subject's visual acuity. Seeing fine details is not required. The officer asks a subject who wears eyeglasses to remove them so that the officer may have a better view of the subject's eyes. The officer verifies that the subject can see the stimulus, which is often the officer's finger, pen or penlight. The inability to see the stimulus with perfect clarity will not produce the clues associated with alcohol impairment.

Are There Other Causes of the Eye Movements Seen During the HGN Test?

Loss of smooth pursuit is normal if an object moves too quickly for the eyes to follow. Most individuals can follow with good accuracy even at speeds of 60-100 degrees per second; this is equivalent to moving the eyes all the way from one side to the other (about 120 degrees total) in about 1.5-2 seconds. During the first part of the HGN test, the officer moves the stimulus at about 30 degrees per second, thus taking about 4 seconds to move the stimulus from side to side. Every normal, sober individual should be able to follow the stimulus with ease.

About 50 percent of normal, sober individuals show a few beats of *endpoint nystagmus*, but the size of the movement will be small and last for no more than 1-2 seconds. *Gaze nystagmus* prior to endpoint and *vertical nystagmus* are not expected in normal, sober individuals.

Many of the following types of nystagmus will be present either when the subject views straight ahead or under conditions that are inconsistent with the HGN and VGN test procedures. Consequently, they will not be mistaken for signs of alcohol impairment by the officer who conducts the tests properly. Note that this is merely an overview of the most com-

mon types of nystagmus and not a complete list of the more than 40 possible types.

About 1 person in 200 has *congenital nystagmus*, which presents at birth or shortly thereafter. Similarly, nystagmus may accompany certain congenital conditions, such as *albinism*, which is identified by the lack of skin and hair pigmentation. In all congenital conditions, and depending on the individual, the nystagmus may be constant, only at certain times (for example, when looking up close or when fatigued), or it may change appearance with the viewing direction (for example, more pronounced when looking right and diminished when looking left).

Some people may develop *pathological nystagmus* later in life. The most common causes are trauma, stroke, and diseases affecting the vestibular system, which controls balance, coordination, and orientation. The vestibular organs are located in the inner ears, and signals from these organs are integrated with vision and other sensory inputs in the cerebellum and brainstem.

Positional alcohol nystagmus (PAN) results from unequal concentrations of alcohol in the blood and in the fluid of the vestibular system. PAN is most obvious when the head is tilted towards the shoulder, or, when lying down, the head is turned to the side. Research has shown that PAN will not be present when the head is upright, as during the HGN test with the subject standing or seated, or when the head is in line with the body when lying down. Even though PAN occurs with alcohol impairment, its presence and severity vary greatly depending on the relative alcohol concentrations in the blood and the vestibular fluid. When the concentrations are equal, PAN could be completely absent, such that the eyes would appear normal during the test!

All normal, sober individuals will demonstrate nystagmus under the appropriate environmental or diagnostic test conditions. For example, *optokinetic nystagmus* occurs when a large portion of the visual field moves relative to the observer, such as a freight train at a railroad crossing or rotating lights projected on a wall. With the head still, the eyes follow the stimulus, jerk back quickly, and follow the stimulus again. The nystagmus

will be present at all gaze angles, even straight ahead, and it will appear the same at all angles. Interestingly, the observer can reduce or negate the nystagmus by focusing on a stationary object or by simply not paying attention to the moving object.

Caloric nystagmus is used to diagnose vestibular problems by instilling warm water or air in one ear, and cool water or air in the other. The resulting nystagmus will be present at all gaze angles, even straight ahead. Testing usually does not continue for more than 15-20 seconds, as the patient will become nauseous and vomit after that time. "Swimmer's ear," when water is trapped in one ear after stepping out of a pool or the shower, will not produce caloric nystagmus, since the temperature difference between the ears is not sufficient. Likewise, driving on a cold night with the window open and the heater on full will not produce caloric nystagmus, since the cold and hot air cannot get directly to the respective inner ears; if they did, the driver would have a soiled vehicle and clothing.

Rotational nystagmus is induced by spinning around, as in a carnival ride. The nystagmus actually dissipates if the spinning continues for more than 15-20 seconds. *Post-rotational nystagmus* is induced immediately after the spinning stops, and normally does not last for more than 10-15 seconds. A roll-over or spin-out could induce rotational nystagmus, but the post-rotational nystagmus will be long gone when the officer examines the driver at the scene of the accident.

Fatigue nystagmus occurs when the eyes are held at maximum deviation for more than 30 seconds. This is actual fatigue of the eye muscles, and has nothing to do with the systemic problem of lack of sleep. Lack of sleep has not been proven conclusively to affect HGN results.

Our best estimate is that about 1 person in 2,000, when sober and in the absence of any drugs or known medical conditions, shows signs that an officer could associate with alcohol impairment. Nevertheless, experienced officers will recognize that the quality of the eye movements is not consistent with those he or she normally observes on impaired individuals. In addition, other typical physical and physiological indicators of

alcohol impairment, such as staggered gait, bloodshot, watery eyes, odor of an alcoholic beverage, inappropriate attitude or behavior, etc., would be absent.

The Bottom Line

No conditions other than impairment with alcohol and other specific drugs will produce exactly the types of eye movements associated with such impairment when assessed with the HGN and VGN tests. A properly trained police officer will know how to distinguish such eye movements. And, the optometrist can be a strong ally to law enforcement when the foundation of the testing and the officer's training are called into question.

The History & Development of HGN: A Research Perspective

By Marcelline Burns, PhD
Southern California Research Institute

Although the Horizontal Gaze Nystagmus test assists traffic officers in the enforcement of alcohol and drug impaired driving statutes, defense attorneys often mount a vigorous effort to exclude testimony about it during impaired driving trials. That effort can be countered with scientific fact. This review covers the development of the battery of sobriety tests that includes HGN and the scientific support for the validity and reliability of HGN.

Automobiles, Alcohol, and Traffic Enforcement

The introduction of motorized vehicles more than 100 years ago profoundly influenced transportation, commerce, lifestyles, resources and the environment. Although it is unlikely that the full impact of automobiles was recognized immediately, the risk of combining alcohol and driving *was* noted with celerity. The first alcohol-and-driving legislation was enacted during the 1920's.

Early in the century, enforcement of prohibitions against combining alcohol and driving was hampered by the lack of a non-invasive test of blood alcohol concentration (BAC). But in the 1930's, advances in the technology of breath-sampling instruments made possible the rapid measurement of an individual's alcohol level. That capability, together with increasing epidemiological evidence of alcohol involvement in traffic crashes, provided impetus for additional legislation. In 1939, the state of Indiana established 0.15% as the BAC limit for driving.

Unless an individual is a chronic heavy drinker and has developed behavioral tolerance to alcohol, he *obviously* will be intoxicated at 0.15% BAC. Laws setting that BAC as a legal limit in effect defined a *drunk* driving

problem and reflected a legislative intent to remove *drunk* drivers from the roadway. The assumption was that officers were familiar with signs of intoxication and would be able to detect and arrest drunk drivers.

Following the end of WWII, more powerful vehicles and multilane roadways exacerbated the problem of alcohol crashes, spurring more research. Data from crash investigations, roadside surveys, and laboratory experiments converged to demonstrate that driving skills are impaired by alcohol at levels substantially lower than 0.15%. Over time, state legislatures passed laws that lowered the BAC limit.

By the mid-1970's, 0.10% laws were in place throughout the United States. Although the lower limits served the interests of traffic safety, they clearly were not a panacea. The nationwide BAC average for DUI drivers remained at 0.17%. That high BAC reflected a number of variables, including community priorities and the allocation of law enforcement resources. With the clear vision of hindsight, another problem was discovered. Quite simply, officers lacked training and often were unable to detect and arrest drivers at or near 0.10% BACs.

High BAC drivers display gross driving errors and signs of intoxication that police officers can readily recognize in most cases. Although a 0.10% BAC unfailingly produces impairment, overt and observable intoxication is not produced in all drinkers on all occasions. Without special training and skills, officers may not recognize individuals whose driving skills are affected but whose drinking experience enables them to *maintain* behaviorally; i.e., they do not display the commonly-recognized signs of intoxication. Plainly, specialized training was needed for DUI enforcement.

Sobriety Test Research

The U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA) sponsored a study of sobriety tests (Burns & Moskowitz, 1977). The investigators initially conducted a laboratory experiment with six tests that met the restrictive criteria of roadside use. Subjects, 238 adult licensed drivers, were given alcohol to produce BACs in the range 0.00% - 0.15%. Traffic officers, who had been trained to

administer the six tests, examined the subjects under double blind conditions (i.e., neither the officers nor the subjects knew how much alcohol the subjects drank), and recorded their arrest/don't arrest decisions for a 0.10% BAC limit. Seventy-six percent of the officers' arrest/release decisions were correct. Statistical analysis identified HGN as the single best test. The investigators recommended HGN, walk-and-turn (WAT), and one-leg stand (OLS) as an optimal three-test battery.

With methods parallel to the first study, a second large study examined the validity and reliability of the three-test battery in the laboratory, assessed its use in the field, and standardized the administration procedures (Tharp, Burns, Moskowitz, 1981). Officers correctly classified 81% of 297 subjects as being above or below 0.10% BAC. A subset of subjects was tested on a second occasion, and the agreement between two tests (test-retest reliability) was found to be near 0.7, an acceptable reliability for psychomotor tests.

NHTSA developed a curriculum to train officers with the three-test battery of Standardized Field Sobriety Tests. Training began in the early 1980's and has now extended to all fifty states as well as to other countries.

Based on crash statistics and laboratory research, state legislatures began to lower the BAC limit to 0.08% during the 1990's. Because the SFSTs were developed for a 0.10% BAC limit, McKnight et al. (2002) undertook a study of sobriety tests for 0.08% and lower BACs. They reported that the SFSTs are valid at the lower limits, that no other measure has greater validity than HGN at 0.08%, and that HGN is the best test at 0.04% BAC, the per se limit for commercial drivers.

The early SFST research was conducted in controlled laboratory conditions. At the time of their participation, the officers in the experiments had limited experience with standardized tests. Thus, data from the early laboratory research do not address questions about the robustness of the tests when used at roadside by experienced officers. Research was undertaken to answer the following specific question: *How accurate are officers' arrest and release decisions when the SFSTs are used by trained and experienced officers?*

In field studies in Colorado (Burns & Anderson, 1995), Florida (Burns & Dioquino, 1998) and California (Stuster & Burns, 1998), arrest records for drivers suspected of DUI offenses were analyzed. In all cases, the arresting officer had been SFST trained by NHTSA guidelines and had at least one year's field experience with the tests. Note that the study samples were *not* drawn at random from all drivers on the roadway. Rather, they were all drivers who were stopped during a study period because of a violation and who were given the SFSTs at roadside. Thus, they were drawn from the specific population for which the test battery was designed.

In answer to the research question, officers' arrest decisions are highly accurate. Ninety-three percent of the arrest decisions in Colorado, 95% in Florida, and 91% in California were supported by breath or blood test results. Release decisions were less accurate, which indicated that officers err more often in releasing impaired drivers than in arresting non-impaired drivers. Arrest decisions were most closely linked to observations of HGN.

DUI enforcement is a vital component of the effort to maintain safe roadways. Given cause to stop a vehicle, an officer must assess the driver's state of sobriety and make a decision to arrest or release within a few minutes. The SFSTs were developed to aid officers in performing this difficult task. Research studies demonstrate that when officers use the SFSTs as part of their information-gathering activity at roadside, a high proportion of their decisions are correct.

Although HGN provides only one part of the evidence that leads to an arrest decision, officers report that they rely heavily on it. HGN enables them to detect the presence of an impairing substance even in individuals who have developed sufficient tolerance that other behavioral cues are minimal. Note, too, that the absence of nystagmus can protect the innocent or non-impaired driver who for some reason is unable to perform balance and walking tests but who has not ingested any alcohol or drug and is not impaired for driving. Although objections to HGN evidence are raised in trial, no other roadside test of equal validity and reliability has been proffered. Preliminary breath test instruments provide evidence

of alcohol use, but they provide no information about drug use. Unless and until better tests or other methods of gathering information about impairment are developed, traffic safety will be best served by 1) officers' use of the SFSTs, including HGN; and 2) admissibility of testimony about them at trial.

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First Person Prosecutor: Taking on the HGN Fight

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Mothers Against Drunk Driving's Candlelight Vigil. 1992. — *Robert Perez…Samuel Goldstein…Jane Smith*…half an hour felt like an eternity as family member after family member announced the names of loved ones killed or maimed by drunk drivers. I struggled to hold back the tears as I listened to fathers, mothers, uncles, aunts, siblings, sons and daughters. All felt and expressed the same pain, the same loss. They changed my life forever. I was determined to make a difference.

1992 was my first year as a Miami-Dade County Assistant State Attorney. The impaired driving conviction rate hovered around fifty percent. Our office routinely "broke down" or reduced driving under the influence of drug charges to reckless driving because our local judges believed that police officers, including Drug Recognition Experts (DREs), were not qualified to testify that someone was under the influence of drugs. The situation was unbearable and intolerable. The opportunity was obvious.

In late 1993, only a year out of law school, my best friend and trial partner, Michael Gilfarb, and I volunteered to conduct a *Frye* hearing on DRE testimony and evidence, including the HGN and other field sobriety tests. We expected the office to assign a senior prosecutor to assist us. We naively believed that the office would never allow Michael and me to conduct the hearing on our own. We were wrong, and we were scared. Manpower issues dictated that we conduct the hearing ourselves.

Fear quickly became our best ally. While Michael assumed all my other responsibilities, I attended as many DUI training schools and seminars as possible, including the Breath Alcohol Technician 40 hour qualification course, Drug-Alcohol Recognition Technician (DART) School, DRE Pre-School and DRE School, to familiarize myself with all aspects of the

DRE protocol. I all but moved into the University of Miami Medical and Law School Libraries, pulling, reading and digesting thousands of pages of medical literature and every case ever decided on the admissibility of DRE testimony and evidence, including HGN and field sobriety tests (FSTs). I ordered and obtained transcripts from five prior DRE hearings. I made contacts with physicians and other experts around the country. Among others, we consulted with Dr. Marcelline Burns, prosecutor Karen Herland, who previously conducted a *Frye* hearing on DRE testimony, and LAPD DRE Thomas Page. They were incredibly knowledgeable and helpful.

We obtained all prior FST and DRE studies. The studies demonstrated that officers and DREs could effectively determine whether a subject is impaired by alcohol or drugs. We knew, however, that our judges would want to know how our local officers, the ones who would be testifying before them on a day to day basis, performed. Accordingly, Michael and I supervised a survey of more than 25,000 Miami-Dade County DUI cases and more than 1,000 Miami-Dade County DRE cases. We reviewed the three largest police agencies' breath test logs from January 1, 1991, through December 31, 1993. We broke down each arrestee's breath test results into four different categories: 0.100% and above, 0.080% through 0.099%, 0.050% through 0.079%, and refusals. We determined that 82.1% of the persons who provided breath samples blew at or above 0.100%. This figure correlated well with NHTSA's finding that the field sobriety tests are 83% accurate in discriminating between drivers with BACs above and below 0.100%. This suggested that our local officers were performing the SFSTs according to NHTSA's standards.

- 85.9% of the drivers blew at 0.100% or above or refused to provide a breath sample. This was telling because the people who failed to provide breath samples lost their licenses for one year for a first refusal or 18 months for a second or subsequent refusal.
- 88.5% of the drivers who provided breath samples blew at 0.080% (the maximum limit in Florida) or above.
- 93.8% of the drivers blew at or above 0.050%. This was significant because the American Medical Association (AMA) recognizes that people are significantly impaired at 0.050% and supports a 0.050% legal limit.

- 95% of all drivers blew at 0.050% or above or refused to provide any breath samples.

Michael and I supplemented our survey by reviewing every DRE case from the same agencies during the same time frame. We learned that the DREs correctly determined whether a subject was impaired in more than 90% of the cases. We also reviewed two of our most active DUI officers' HGN logs. We learned that the officers were more than 95% accurate in identifying people above the legal limit and/or under the influence of depressants.

In 1994, Michael and I filed a 159-page Initial Brief and formally requested a hearing. We provided the court with more than 2,000 pages of medical literature and hundreds of cases. Two months later, we conducted an en masse hearing in front of four county court judges. We presented 12 expert witnesses from around the country and the above documentation. The defense responded with several experts of its own. After a one-week hearing, Judge Maxine Cohen Lando held that *all* DRE testimony and evidence is admissible. Further, she ruled that HGN test results could be used to establish a subject's blood alcohol level. The defense appealed. We went back to the libraries and drafted additional response briefs and pleadings. Finally, the appellate court affirmed Judge Lando's ruling and agreed that the tests are generally accepted as accurate and reliable. However, the court determined that HGN could not be used to establish an unlawful blood alcohol level absent a confirmatory blood, breath or urine test because the legislature had not adopted the test for that purpose. Our hard work paid off.

I continue to attend the Candlelight Vigils. Each year, the roll call grows longer and longer. As prosecutors, we cannot save everyone. However, through vigorous, aggressive, proactive enforcement, regardless of our age and experience, we can save some.

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