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Much Ado About Nothing¹

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Within the last year, three cases² have cast doubt on the admissibility of Standardized Field Sobriety Tests (SFSTs) in making drunk driver arrests. Attacks on the SFSTs, such as in *Horn*, *Lasworth* and *Dahood*, are not new,³ nor are these attacks always upheld.⁴ While these recent cases are quite persuasive in their analysis of the SFSTs, they are from foreign jurisdictions with different evidentiary standards than exist in Wisconsin. The SFSTs have been and will continue to be an important part of an officer's field determination of individual driver intoxication. These challenges to the SFSTs are effectively, MUCHADOABOUT NOTHING.⁵

In the three cases, the courts rejected as admissible evidence either the horizontal gaze nystagmus (HGN) test alone or the entire SFST battery. In *Horn*, the court determined that the SFSTs were not admissible to prove a specific blood alcohol

concentration (BAC).⁶ In *Lasworth*, the court determined that the HGN field sobriety test was not a scientifically valid method of determining if an individual had a BAC of above or below 0.08.⁷ The court in *Dahood*, determined that HGN test results were not reliable and therefore not admissible evidence.⁸ However, the courts collectively upheld the use of SFSTs and the HGN test as sufficient to establish probable cause.⁹

The goal of this report is to discuss and evaluate the three cases giving rise to the admissibility of SFSTs. First, the report will provide a brief overview of the history and the administration of the SFSTs. Second, the report will discuss evidentiary standards in Wisconsin and other jurisdictions. Third, the report will review, examine and discuss *Horn*, *Lasworth* and *Dahood*. Fourth, the report will return its focus to Wisconsin and discuss some of

the potential challenges and responses to evidentiary challenges raised in this jurisdiction. Finally, the report concludes with general recommendations in light of the cases for prosecuting attorneys, defense attorneys, those administering the SFSTs and those testing the SFSTs.

A Brief Discussion of the SFSTs

In 1977, Marcelline Burns, Ph.D.¹⁰ (Burns) and Herbert Moskowitz, Ph.D.,¹¹ of the Southern California Research Institute (SCRI), prepared a final report for the National Highway Traffic Safety Administration (NHTSA) which presented the three SFSTs, the proper administration of the tests, procedure for scoring the tests and the reliability of the tests.¹² Since then, Burns has conducted numerous validation tests on the SFSTs, as recently as 1998 in California.¹³ The Southern California Research Institute is

a non-profit entity organized under the California Attorney General.¹⁴

The three tests are the Walk and Turn (WAT), One Leg Stand (OLS) and the HGN test.¹⁵ The first two are divided attention tests, in that they consist of two stages. In the WAT, they are the (1) instructions stage; and (2) walking stage. In the one-leg stand, they are the (1) instructions stage; and (2) balance and counting stage. The WAT test requires that an individual receive instructions while standing still and then take nine heel-to-toe steps in a straight line while counting the steps out loud, turn 180 degrees and return taking nine more heel-to-toe steps, while at all times watching his or her feet.¹⁶ Briefly, the OLS test requires an individual to receive instructions, raise one leg six inches from the ground, balance on the remaining leg and count out loud as follows, “one thousand one, one thousand two, one thousand three” and so forth for a period of thirty-seconds.¹⁷

Finally, the HGN test involves an examination of the individual’s eyes by the officer. Each eye is examined for three specific clues. First, the officer looks for an inability of each eye to follow a moving stimulus smoothly;¹⁸ Second, the officer examines the individual’s eyes for distinct nystagmus at the

maximum right and left positions of the eyes;¹⁹ Finally, the officer notes the presence or lack of nystagmus before the eyes have moved forty-five degrees horizontally from center.²⁰ Each eye is examined individually and the score is tallied by combining all three examinations in both eyes to equal a total of six possible clues. With the HGN test alone, if the officer observes four out of the six possible indicators, the NHTSA student manual states that the individual’s BAC is likely above 0.10.²¹

In *Horn*, the court relied on the description of nystagmus found in the NHTSA student manual, “[n]ystagmus is ‘the involuntary jerking of the eyes, occurring as the eyes gaze toward the side. Also, nystagmus is a natural, normal phenomenon. Alcohol and certain other drugs do not cause this phenomenon, they merely exaggerate it or magnify it.’”²² The effects of alcohol on the oculomotor system have been of interest to doctors and researchers for nearly 40 years. In 1966, Henry Murphee reported on the incidence of nystagmus and the consumption of alcohol.²³ As the phrase implies, HGN is nystagmus as the eyes gaze to the side.²⁴

Evidentiary Standards

Field sobriety tests have long been used to aid in the

determination of an individual driver’s intoxication. The “standardized” field sobriety tests were developed in 1977 and were first recognized as admissible evidence in 1986 by the Supreme Court of Arizona, in *State v. Superior Court*.²⁵ After that decision, other courts followed, completing their own analysis of the SFSTs or relying on other court decisions, but applying the evidentiary standards of the time. States differ in their use of evidentiary standards. In Wisconsin, the evidentiary standard was established in *State v. Walstad*,²⁶ and most recently elucidated in *State v. Davis*.²⁷ It is considered a general relevancy test. Other jurisdictions may use the *Frye*²⁸ test, the *Daubert/Kumho Tire*²⁹ test or a combination of the two. In the three cases discussed here, the jurisdictions employ Rule 702 of the Federal Rules of Evidence and the *Daubert/Kumho Tire* test.³⁰

Frye

The *Frye* test for admissibility of scientific or technical evidence was the most common standard before the *Daubert* decision. Under *Frye*, the sole question was whether the methods or principles proffered had gained general acceptance within the relevant scientific or technical community.³¹ This test was abandoned in order to allow scientifically sound testimony

that had not yet become generally acceptable.

Daubert/Kumho Tire

Under Federal Rule of Evidence § 702, testimony must be based on sufficient data or facts, must be the result of reliable methods or principles, and must be the result of reliable application of the methods or principles to the facts at hand.³² Under the *Daubert/Kumho Tire* test, the “four non-exclusive evaluative factors” are: “(a) whether the opinions offered are testable; (b) whether the methods or principles used to reach the opinions have been subject to peer review evaluation; (c) whether a known error rate can be identified . . . and . . . (d) whether the opinion rests on methodology that is generally accepted within the relevant scientific or technical community.”³³ *Daubert* initially created these standards for technical evidence, while *Kumho Tire* extended these standards to include non-technical evidence.

Wisconsin

Wisconsin does not follow either the *Frye* test or the *Daubert/Kumho Tire* test. Rather, the State of Wisconsin follows the general relevancy test. The *Frye* test “has been explicitly rejected... [and] is alien to the Wisconsin law of evidence.”³⁴ As recently as 1995, in *State v. Peters*, the court makes clear that

Wisconsin does not adhere to the *Frye* test, nor is it affected by the United States Supreme Court decision in *Daubert*.³⁵

In *Walstad*, the Supreme Court of Wisconsin determined that “if the evidence is relevant, it is admissible, unless it is excluded for some special reason, such as prejudicial effect or jury confusion.”³⁶ The trial court applies Wisconsin Rule of Evidence § 904.01, which defines relevant evidence as “evidence having 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.”³⁷ In *State v. Davis*³⁸ the court defines relevancy in two parts: “(1) the evidence must relate to a fact or proposition that is of consequence to the determination of the action, and (2) the evidence must have probative value, that is, a tendency to establish those consequential propositions.”³⁹

Further, the *Walstad* court notes that “expert testimony... will be excluded only if the testimony is superfluous or a waste of time.”⁴⁰ Wis. Stat. § 907.02 provides that “if scientific or specialized knowledge will assist the trier of fact to determine a fact in issue, a qualified expert may testify.”⁴¹ Qualified experts can be so “qualified as an expert by knowledge, skill,

experience, training, or education.”⁴²

The court further provides that “the admissibility of scientific evidence is not conditioned upon its reliability.”⁴³ The court notes that “scientific evidence is admissible under the relevancy test regardless of the scientific principle that underlies the evidence.”⁴⁴ In *Walstad*, the court made clear, “admissibility comes at the time the witness is ‘qualified’ as an expert. In a state such as Wisconsin, where substantially unlimited cross-examination is permitted, the underlying theory or principle on which admissibility is based can be attacked by cross-examination or by other types of impeachment. Whether a scientific witness whose testimony is relevant is believed is a question of credibility for the finder of fact, but it clearly is admissible” and would go to weight, not admissibility.⁴⁵

The Cases Casting Doubt on the Admissibility of SFSTs

State v. Horn

On June 28, 2000, Sergeant Eric D. Horn attempted to enter the Aberdeen Proving Ground in Maryland. He was stopped for an identification check. At that time Officer Daniel L. Jarrell suspected that Horn had been driving under the influence and Horn was detained, questioned, and the three SFST battery was

administered: WAT, OLS and HGN. As a result of his performance on the SFSTs, Horn was charged with driving while intoxicated. Horn filed a motion *in limine* to exclude his performance on the SFSTs, on the basis that the performance would be inadmissible under the *Daubert/Kumho Tire* test and Federal Rule of Evidence § 702.⁴⁶ A two-day evidentiary hearing was conducted. The court concluded the following: (1) properly conducted SFSTs may be considered for probable cause to charge a driver with driving while intoxicated or under the influence; (2) that the SFSTs were not admissible to prove a specific BAC of an individual; (3) the connection between alcohol consumption and exaggerated HGN may be judicially noted; (4) officers trained in the SFSTs, when administered properly, may testify as to their observations during the tests, but may not use language that the individual “failed the test” or “exhibited” a number of clues; (5) if nystagmus is presented by the prosecution, the defense is entitled to show that there are many causes of nystagmus other than alcohol consumption; and (6) officers can provide lay opinion testimony regarding their observations without making reference to any scientific, technical or specialized information.⁴⁷

The court reviewed the

necessary requirements to find the results of the SFSTs admissible. Briefly, they must be non-prejudicial, relevant, and if scientific, the admissibility is dependent on meeting Federal Rule of Evidence § 702 and the *Daubert/Kumho Tire* test.⁴⁸ Importantly, Horn “acknowledged that the [SFST] tests may be used to determine probable cause” and the “Government acknowledge[d] that [the SFSTs] are not admissible to prove the defendant’s specific BAC.”⁴⁹ What remained in question was to what extent the SFST results could be used as circumstantial evidence that a driver was impaired or intoxicated by alcohol.

Horn challenged the reliability, validity and relevance of the SFSTs to prove driver intoxication.⁵⁰ The court first reviewed and examined the SFSTs.⁵¹ The court noted that “reliability means the ability of a test to be duplicated, producing the same or substantially same results when successively performed under the same conditions.” This was illustrated by explaining that different officers, observing the same individual, would reach the same conclusion and that a single officer testing and retesting an individual would come to the same consistent conclusion. As for validity, the court noted that there would have to be a “logical nexus

between what the tests measure and the true ability of a driver to safely operate a motor vehicle.”⁵² The court was seeking an established connection between test performance and the determination that an individual is an impaired or intoxicated driver.

The defense produced four experts during the evidentiary hearing.⁵³ The experts were critical of the reliability of the SFSTs. They pointed out that the reliability of the tests were at best close to 80%, but often suffered from a reliability level closer to 50%.⁵⁴ This was important since the scientific community, in general, expects reliability to be better than 90%.⁵⁵ They pointed to the high level of false-positives, where test subjects were classified as having a BAC above 0.10, when they actually possessed a BAC of less than 0.10.⁵⁶ Significant difficulty in reviewing the field tests conducted by Burns was also encountered and therefore the experts determined that the field validation studies were not scientifically acceptable. Additionally, there was a lack of a determinable known error rate for the SFSTs in the field.⁵⁷ The numerous studies by Burns were conducted at different BAC levels and therefore the experts reasoned, the tests were not cumulative but rather evaluated different measures and as a result, they could not validate each other.⁵⁸

Finally reviewing all the studies, the defense experts concluded that the data was not subject to rigorous experimental controls and the experimental results were often due to numerous factors in addition to the application of the SFSTs.⁵⁹ For example, the drivers in the Florida and Colorado studies were stopped because of unsafe driving. Thus, the presenting cause for the stop created a presumption of driver impairment.

In response, the prosecution provided numerous NHTSA reports, field study validation reports, the affidavit of the arresting officer, and the affidavit of Lieutenant Colonel Jeff C. Rabin, O.D., Ph.D., a licensed optometrist on active duty in the Army.⁶⁰ Colonel Rabin “confirmed the fact that alcohol ingestion can enhance the presence of nystagmus in the human eye at BAC levels as low as .04.”⁶¹ Colonel Rabin acknowledged that any expertise he had was the result of his duties as an expert witness for Army prosecutors in two courts martial and not independent research. Further, he noted that there were numerous non-alcohol related causes of exaggerated nystagmus and he had no opinion on the NHTSA SFST studies conducted by Burns.⁶²

The court applied the *Daubert/Kumho Tire* test to the evidence presented and to information gained in its

review of state cases examining the SFSTs rigorously and under distinguished standards.⁶³ While finding that there was a causal connection between exaggerated HGN and alcohol ingestion, the court noted that exaggerated HGN can be caused by more than alcohol ingestion.⁶⁴ It also made clear that the data and facts underlying the NHTSA assertions on the reliability of the SFSTs to predict a BAC are insufficient to support such claims. The court found that the science behind the SFSTs was based on an insufficient method, that the error rates were unknown and the studies had not been subject to peer review as contemplated by the court in the *Daubert* and *Kumho Tire* decisions.⁶⁵

State v. Laworth

On September 10, 1998, James Lasworth was traveling in the wrong direction on an interstate entrance ramp.⁶⁶ Upon stopping the car, the arresting officer noted that there were “signs of impairment” and administered a SFST. Due to his performance, the officer arrested Lasworth, who submitted to a breath alcohol test, which indicated a BAC of 0.09.⁶⁷ Lasworth was subsequently convicted of driving while under the influence. He appealed and the district court conducted a trial de novo without jury.⁶⁸ At the conclusion of motions and

hearings, the HGN test was found to be an invalid method for determining if a suspect had a BAC above or below the statutorily defined level.

The district court heard the testimony of the arresting officer, “with the understanding that the court would disregard this testimony if the State’s expert was unable to establish a foundation for its admission.” The arresting officer described the SFST that was administered to the defendant and noted that Lasworth displayed all six clues under the HGN test, which indicated to the officer that Lasworth was “‘under the influence’ of alcohol or another central nervous system depressant.”⁶⁹ The State offered Marcelline Burns, Ph.D., as an expert in HGN testing at which point defense counsel objected. Under New Mexico evidentiary standards, the district court believed that HGN evidence must be both scientifically valid and scientifically reliable. The court concluded that Burns was unqualified to establish scientific validity.⁷⁰ On appeal, the court first reviewed whether the evidence had scientific validity.⁷¹ The court reviewed the testimony of Burns and her work, including a 1998 field validation study,⁷² which included the following statement: “The only appropriate criterion measure to assess the accuracy of the SFSTs is BAC. Measures of

impairment are irrelevant because performance of the SFSTs must be correlated with BAC level, rather than driving performance.”⁷³ As a result of Burns’ testimony and written work, the Court of Appeals determined that the HGN test “has not been scientifically validated as a direct measure of impairment.”⁷⁴

The appeals court determined that the State was required to establish two elements in order to lay a foundation for the admission of the arresting officer’s statement that Lasworth was under the influence: (1) “that the HGN [field sobriety test] is a scientifically valid means of discriminating between BAC’s” above and below 0.08 percent and (2) “that a BAC at or above 0.08 percent correlates with diminishment of Defendant’s mental or physical driving skills.”⁷⁵ The State’s use of Burns was viewed by the court as an attempt to establish the first element and was found unsatisfactory after a review of testimony and written materials.⁷⁶ The appeals court shared many of the same concerns as the court in *Horn*. It also determined that since the last version of the New Mexico Motor Vehicle Code was enacted in 1978, no addition has been made “to authorize a conviction based upon the results of non-chemical BAC tests such as the HGN [field sobriety

test].”⁷⁷ Additionally, the court also was quite clear that the HGN test can establish probable cause for arrest or “reasonable grounds” for administering a chemical BAC test.⁷⁸

The court affirmed the district court’s ruling that the HGN tests were not admissible at trial. However, it is not clear whether the State sustained a case against Lasworth without the HGN field sobriety test. Further, the New Mexico Supreme Court denied certiorari.⁷⁹

State v. Dahood

In 1999, Michael Dahood appealed his conviction for driving while under the influence and argued that the district court erred in failing to hold a hearing on the HGN test and the admission of such test was not allowed under New Hampshire Rule of Evidence 702.⁸⁰ The Supreme Court of New Hampshire remanded the case to hold an evidentiary hearing and find whether the HGN test was a scientific test, and if so, determine if the test was reliable as required by the Rules of Evidence.⁸¹ The parties completed “five days of expert testimony” and reviewed numerous written works.⁸² The parties stipulated that the HGN test was scientific evidence, that it incorporated scientific principles and that the legal standard to be applied was determined by the New

Hampshire Supreme Court and *Daubert*.⁸³ Importantly, the parties also stipulated that the HGN test was not “to calculate or provide testimony as to a defendant’s specific blood alcohol content (BAC).”⁸⁴ As a result of the evidentiary hearing, the court ruled that the HGN test was not reliable evidence, could not be used for trial purposes, but was admissible to establish probable cause.⁸⁵

After a review of the *Daubert* test and a detailed description of both nystagmus and HGN, the court examined the testimony of Marcelline Burns, Ph.D., and three experts proffered by the defense and prosecution.⁸⁶ Burns testified that there were weaknesses in her testing.⁸⁷ First, “she did not consult with ophthalmologists or neurologists when designing or implementing her studies.”⁸⁸ Second, she admitted that “no true reliability testing” was performed.⁸⁹ Third, the studies were not controlled for a number of factors including “breath odor, swaying, vehicle operation, bloodshot eyes, subject attitude, etc.”⁹⁰ And finally, in both the 1977 and 1981 studies, the obese and elderly were excluded “for no particular reason.”⁹¹ The State’s own witness, Dr. Jack Richman, testified that Burns’ studies were selectively referenced, specialists were not consulted, and controls in the experiment were weak.⁹² The defense’s experts were

generally critical of the studies. They found the error rates of HGN testing too high. They also faulted the design and lack of control of the studies by Burns and provided unchallenged testimony regarding the general lack of peer-review among Burns' studies.⁹³

The court also examined the standards controlling the HGN test's operation by reviewing the NHTSA manual,⁹⁴ and the testimony of Sergeant William H. Quigley.⁹⁵ Sergeant Quigley testified as to New Hampshire officer training in SFSTs and noted that substitution of one field sobriety test for another is taught when a standardized field sobriety test is unable to be performed. He also noted that there is no one-on-one observation of officers practicing the HGN test and the written examination given to the officers can be passed while failing to correctly answer any questions relating to HGN.⁹⁶ Further, no certification is offered, no refresher course mandated and no review of officers employed by New Hampshire who previously received their training out of state.⁹⁷ The State's case was further hampered by the demonstration of the SFSTs by Sergeant Quigley. In the demonstration, the experts found that the officer deviated from standardized procedure.⁹⁸ The court concluded that under the *Daubert* four-part

template, the State fell short in establishing the scientific reliability of the HGN test under Rule 702.⁹⁹ However, in addressing the use of the HGN test results at a suppression hearing, the court concluded they were sufficiently reliable to be admitted for a probable cause showing, assuming the New Hampshire Rules of Evidence did not apply.

SFSTs in Wisconsin

The State of Wisconsin employs a significantly different evidentiary standard than that of the courts in the three cases above. Wisconsin uses a general relevancy test for the admissibility of evidence.¹⁰⁰ Therefore, analysis regarding whether the SFSTs have been subject to peer review, meet general acceptance, or have a known error rate are not conclusive, as these are factors of the *Daubert/Kumho Tire* test and not Wisconsin's general relevancy test.

Applying the definition of relevant evidence under Wis. Stat. § 904.01, as "evidence having 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,"¹⁰¹ it would seem the SFSTs, including the HGN test, are relevant. In *Davis*, the court provided a two-part relevancy test: "(1) the

evidence must relate to a fact or proposition that is of consequence to the determination of the action; and (2) the evidence must have probative value, that is, a tendency to establish those consequential propositions."¹⁰² The testimony of the defense experts, in the three cases above, place the SFSTs as having greater than 50% reliability. As the SFST results are indicators of alcohol intoxication or influence, they are probative and relate to the issue at hand in an OWI case.

However, based on the testimony offered in the cases above, it is conceivable that an individual could fail the WAT, OLS and HGN tests due to a prior or existing medical condition. It is important to note that the NHTSA manual on SFSTs does not instruct officers to inquire about prior medical conditions.¹⁰³ One can imagine the case where a suspect has poor strength and balance, difficulty walking heel-to-toe and some sort of oculomotor condition exaggerating the natural nystagmus that all individuals display. Therefore, on their own, SFSTs are not conclusively indicative of alcohol consumption. But with the presence of other indicators of alcohol consumption, such as odor of intoxicants or bloodshot eyes, the SFSTs have been found admissible.¹⁰⁴ The SFST battery was established after

many years of combating drunk driving and should be viewed as an additional tool, not an exclusive indicator, to determine if someone is under the influence.

In *State v. Zivic*, the court held that HGN test results are admissible provided they are accompanied by testimony of an officer who is properly trained to administer and evaluate the test. Further, the court stated that a second expert witness, in addition to the law enforcement officer, is not required for the admission of the HGN test results. In Wisconsin, experts are typically qualified because they possess “superior knowledge in the area in which the precise question lies.”¹⁰⁵ Police officers who have been properly trained in the administration of SFSTs have been qualified as experts in Wisconsin.¹⁰⁶

Conclusion

Horn, Lasworth and Dahood are insightful in their analysis of the science underlying the SFSTs and the admissibility of those tests in jurisdictions employing the *Daubert/Kumho Tire* test. In Wisconsin, the general relevancy test could present barriers to the admissibility of SFSTs absent corroborating evidence of alcohol consumption, such as the odor of intoxicants, bloodshot eyes or slurred speech. But this is all MUCH ADO ABOUT NOTHING,¹⁰⁷ as officers always observe more than just the suspect’s performance on the SFSTs before making an arrest.

The proper administration of the SFSTs has a strong correlation to their accuracy and validity as indicators of alcohol intoxication or

influence, as noted in each of the decisions.¹⁰⁸ Police officers, prosecutors and defense attorneys should be quite familiar with the SFST manuals and test procedures so that they may competently administer the tests and examine witnesses accordingly. New SFST validation studies could be conducted in light of the *Daubert/Kumho Tire* test and the criticisms of competent researchers. Chemical tests determining an individual’s BAC are also useful to establish a *per se* violation of operation while driving under the influence of an intoxicant. SFSTs are helpful tools in the fight against impaired driving and, as the cases above make clear, are sufficient to assist an officer in a probable cause determination.

Endnotes

1. WILLIAM SHAKESPEARE, *MUCH ADO ABOUT NOTHING* (1598).
2. *United States v. Horn*, 185 F.Supp.2d 530 (D. Md. 2002); *State v. Lasworth*, 2002-NCMA-29, 42 P.3d 844 (N.M. Ct. App. 2001), *cert. denied*, No. 27,333, 42 P.3d 842 (2002); *State v. Dahood*, No. 96-JT-707 (N.H. Concord Dist. Ct. Apr. 29, 2002).
3. See Charles R. Honts & Susan L. Amato-Henderson, *Horizontal Gaze Nystagmus Test: The State of the Science in 1995*, 71 N.D. L. REV. 671 (1995); Dr. Ronald H. Nowaczyk and Dr. Spurgeon Cole, *Separating Myth from Fact: A Review of Research on the Field Sobriety Tests*, 19 CHAMPION 40 (1995).
4. See *State v. Baue*, 258 Neb. 968, 607 N.W.2d 191 (2000), holding that the HGN test was generally accepted by the relevant scientific community; which overruled, in part, *State v. Borchardt*, 224 Neb. 47, 395 N.W.2d 551 (1986), in which the Supreme Court of Nebraska implicitly concluded that the HGN test was not accepted by scientists.
5. WILLIAM SHAKESPEARE, *MUCH ADO ABOUT NOTHING*.
6. *Horn*, 185 F.Supp.2d at 533-534.
7. *Lasworth*, 42 P.3d at 848.
8. *Dahood*, No. 96-JT-707 at 3.
9. *Horn*, 185 F.Supp.2d at 532; *Lasworth*, 42 P.3d at 850; *Dahood*, No. 96-JT-707 at 31.

10. Dr. Burns conducts research at the Southern California Research Institute where she and her colleagues use driving simulators and other computer-based systems to study the effects of alcohol and drugs on human performance. Her recent research includes laboratory experiments with cocaine, amphetamine, marijuana, and medicinal drugs, and field validation studies of the Standardized Field Sobriety Tests. She consults and provides expert testimony concerning alcohol and drugs effects on driving, sobriety tests and drug recognition methods, serves on committees for various traffic safety groups, and frequently speaks at professional conferences. Online at <http://www.scri.org/mburns.htm>
11. Herbert Moskowitz is currently Professor Emeritus of Psychology at California State University at Los Angeles, Research Psychologist at the University of California Los Angeles, President of the Southern California Research Institute, principal investigator for two studies for the National Highway Traffic Safety Administration, associate editor of the journal *Accident Analysis and Prevention* and a consultant to various groups. He received a Bachelors Degree in Physics from the University of California at Berkeley in 1948 and a Ph.D. in Experimental Psychology from the University of California at Los Angeles in 1958. From 1958 to the present, he has been on the faculties of the University of California, Los Angeles and California State University of Los Angeles. Dr. Moskowitz is a fellow of the American Psychology Association and its psychopharmacology and substance abuse division, as well as the divisions of engineering psychology and physiological psychology. He is a member of the American Psychology Law Society, the Society of Engineering Psychologists, the Research Society on Alcoholism, the International Cannabis Research Society, the Human Factor and Ergonomics Society and many others. In 1977 he received the Annual Traffic Safety Award of the Human Factor and Ergonomics Society for "Outstanding Contributions to the Understanding of Driver Behavior." For a more complete description, see <http://www.scri.org/hmosk.htm>
12. NHTSA, *DWI Detection and Standardized Field Sobriety Testing*, Student Manual, U.S. Department of Transportation, HS 178 R2/00.
13. J. Stuster and M. Burns, *Validation of the Standardized Field Sobriety Test Battery at BAC's Below 0.10 Percent, Final Report*, submitted to the U.S. Dept. of Transportation, NHTSA (1998).
14. *Id.*
15. *DWI Detection and Standardized Field Sobriety Testing*. Additional field sobriety tests include the finger-to-nose test, the Rhomberg (standing with eyes closed and head tilted back) and a recitation of the alphabet.
16. *Id.* at VIII-9-12.
17. *Id.* at VIII-12-14.
18. *Id.* at VIII-3-8. This is often referred to as "lack of smooth pursuit."
19. *Id.* This is often referred to as "distinct nystagmus at maximum deviation."
20. *Id.* This is often referred to as "onset of nystagmus prior to 45 degrees."
21. *Id.*
22. *Id.* at VIII-3.
23. Henery Murphee, et al., *Effect of Congeners in Alcoholic Beverages on the Incidence of Nystagmus*, 27 Q. J. STUD. ON ALCOHOL 201 (1966).
24. *Horn*, 185 F.Supp.2d at 537.
25. 149 Ariz. 269, 718 P.2d 171 (1986). The Supreme Court of Arizona applied a *Frye* test.
26. 119 Wis. 2d 483, 351 N.W.2d 469 (1994).
27. 2002 WI 75, 645 N.W.2d 913 (2002).
28. *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923).
29. *Daubert v. Merrel Dow Pharms., Inc.*, 509 U.S. 579, 113 S.Ct. 2786, 125 L.Ed.2d 469 (1993); *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 119 S.Ct. 1167, 143 L.Ed.2d 238 (1999).
30. In *Horn*, the United States District Court for the District of Maryland expressly applies the Federal Rules of Evidence and the *Daubert/Kumho Tire* test. In *Lasworth*, the court applies the standard found in *State v. Alberica*, 116 N.M. 156, 861 P.2d 192 (1993), which follows the Federal Rules of Evidence and the *Daubert* decision. In *Dahood*, the court applies the standard found in *State v. Hungerford*, 142 N.H. 110, 697 A.2d 916 (1997), which employs the *Daubert* factors.
31. *Frye*, 293 F. 1013.
32. *Horn*, 185 F.Supp.2d at 535.
33. *Id.*

34. *Walstad*, 119 Wis. 2d at 515, 351 N.W.2d at 485.
35. 192 Wis. 2d 674, 687, 534 N.W.2d 867, 872 (Ct. App. 1995), *cert. denied*, No. 94-1094-CR, 537 N.W.2d 572 (1995).
36. *Walstad*, 119 Wis. 2d at 516, 351 N.W.2d at 485.
37. WIS. STAT. § 904.01 (West 2002).
38. 2002 WI 75, 645 N.W.2d 913.
39. *Davis*, 645 N.W.2d at 920.
40. *Walstad*, 119 Wis. 2d at 516, 351 N.W.2d at 486.
41. *Walstad*, 119 Wis. 2d at 515, 351 N.W.2d at 485.
42. WIS. STAT. § 907.02 (West 2002).
43. *Peters*, 192 Wis. 2d at 687.
44. *Id.* at 688, 534 N.W.2d at 872.
45. *Walstad*, 119 Wis. 2d at 519, 351 N.W.2d at 487.
46. *Horn*, 185 F.Supp.2d at 532.
47. *Id.* at 533-534.
48. *Id.* at 534.
49. *Id.*
50. *Id.* at 538. Aside from the court's interpretation of these terms, the Reference Manual on Scientific Evidence (2nd ed.) is instructive. Reference Manual on Sci. Evid. 83 (2d ed.) at 102-103.

1. Is the Measurement Process Reliable?

There are two main aspects to the accuracy of measurements — reliability and validity. In science, "reliability" refers to reproducibility of results. A reliable measuring instrument returns consistent measurements of the same quantity. A scale, for example, is reliable if it reports the same weight for the same object time and again. It may not be accurate — it may always report a weight that is too high or one that is too low — but the perfectly reliable scale always reports the same weight for the same object. Its errors, if any, are systematic; they always point in the same direction.

Reliability can be ascertained by measuring the same quantity several times. For instance, one method of DNA identification requires a laboratory to determine the lengths of fragments of DNA. By making duplicate measurements of DNA fragments, a laboratory can determine the likelihood that two measurements will differ by specified amounts. Such results are needed when deciding whether an observed discrepancy between a crime sample and a suspect sample is sufficient to exclude the suspect.

2. Is the Measurement Process Valid?

Reliability is necessary, but not sufficient, to ensure accuracy. In addition to reliability, "validity" is needed. A valid measuring instrument measures what it is supposed to. Thus, a polygraph measures certain physiological responses to stimuli. It may accomplish this task reliably. Nevertheless, it is not valid as a lie detector unless increases in pulse rate, blood pressure, and the like are well correlated with conscious deception.

When an independent and reasonably accurate way of measuring the variable of interest is available, it may be used to validate the measuring system in question. Breathalyzer readings may be validated against alcohol levels found in blood samples. Employment test scores may be validated against job performance. A common measure of validity is the correlation coefficient between the criterion (job performance) and the predictor (the test score).

51. *Id.* at 536.
52. *Id.* at 539.
53. The four experts were: Yale Caplan, Ph.D. (former chief toxicologist for the State of Maryland and former scientific director of the Maryland Alcohol Testing Program); Spurgeon Cole, Ph.D. (Professor of Psychology, Clemson University and author of both general and journal articles critical of the SFSTs); Harold P. Brull (licensed psychologist and consultant); and Joel Wiesen, Ph.D. (industrial psychologist).
54. *Horn*, 185 F.Supp.2d at 539.

55. *Id.* at 540. The Reference Manual on Scientific Evidence (2nd ed.), prepared by the Federal Judicial Center 2000, supports a high level:

In practice, statistical analysts often use certain preset significance levels — typically .05 or .01. The .05 level is the most common in social science, and an analyst who speaks of "significant" results without specifying the threshold probably is using this figure. An unexplained reference to "highly significant" results probably means that p is less than .01 (the chance that the effect is due to another factor, and not the one purported, is less than 1%).

Since the term "significant" is merely a label for certain kinds of p-values, it is subject to the same limitations as are p-values themselves. Analysts may refer to a difference as "significant," meaning only that the p-value is below some threshold value. Significance depends not only on the magnitude of the effect, but also on the sample size (among other things). Statisticians distinguish between "statistical" and "practical" significance. When practical significance is lacking — when the size of a disparity or correlation is negligible — there is no reason to worry about statistical significance.

56. *Id.* at 539.

57. *Id.* at 544.

58. *Id.* at 543.

59. *Id.* at 544.

60. *Id.* at 545-546.

61. *Id.* at 546.

62. *Id.*

63. *Id.* at 555.

64. *Id.* at 556.

65. *Id.*

66. *Lasworth*, 42 P.3d at 846.

67. *Lasworth* was charged and convicted of driving while under the influence in violation of N.M. STAT. ANN. § 66-8-102 (Michie 1978-2002), which provides in part “A. It is unlawful for any person who is under the influence of intoxicating liquor to drive any vehicle within this state... C. It is unlawful for any person who has an alcohol concentration of eight one-hundredths [0.08] or more in his blood or breath to drive any vehicle within this state.”

68. *Id.*

69. *Id.*

70. *Id.*

71. *Id.* at 847. Under the New Mexico standard, *Alberico*, there must be “proof of the technique’s ability to show what it purports to show.” 861 P.2d at 203.

72. *Validation of the Standardized Field Sobriety Test Battery at BAC’s Below 0.10 Percent*

73. *Lasworth*, 42 P.3d at 847.

74. *Id.* at 848.

75. *Id.*

76. *Id.* at 849.

77. *Id.* at 850.

78. *Id.*

79. Cert. denied, 42 P.3d 842, N.M. 20002 (No. 27,333), March 5, 2002.

80. *Dahood*, No. 96-JT-707 at 1.

81. *Id.* at 1-2.

82. *Id.* at 2.

83. *Id.* The New Hampshire Supreme Court’s interpretation of the New Hampshire Rule of Evidence § 702 was determined by *State v. Hungerford*, 142 N.H. 110 (1997), which employed the *Daubert* test.

84. *Id.*

85. *Id.* at 3.

86. Dr. Jack Richman was called by the prosecution (full professor of optometry and practicing optometrist). Dr. Joseph Citron (board certified in ophthalmology, licensed to practice medicine and member of the Georgia Bar) and Dr. Joseph Rizzo (board certified in neurology and ophthalmology,

instructor at Harvard Medical School and author of articles on nystagmus for the *American Academy of Ophthalmology Review Manual*) were called by the defense.

87. *Id.* at 7.
88. *Id.*
89. *Id.*
90. *Id.* at 7-8.
91. *Id.* at 8.
92. *Id.* at 9.
93. *Id.* at 9-14.
94. *DWI Detection and Standardized Field Sobriety Testing* (2001).
95. *Dahood*, No. 96-JT-707 at 19-23.
96. *Id.* at 24.
97. *Id.* at 24.
98. *Id.* at 26.
99. *Id.* at 28.
100. *Walstad*, 119 Wis. 2d at 516, 351 N.W.2d at 485.
101. WIS. STAT. § 904.01.
102. 645 N.W.2d at 920.
103. *Dahood*, No. 96-JT-707 at 25.
104. *See State v. Zivcic*, 229 Wis. 2d 119, 127, 598 N.W.2d 565, 569 (Ct. App. 1999), *review denied*, 239 Wis. 2d 308, 619 N.W.2d 91 (2000). Additionally, failing the SFST examination can result in a proper finding of driving while intoxicated, even when a preliminary breath test indicates a BAC of 0.01. *County of Dane v. Sharpee*, 154 Wis. 2d 515, 453 N.W.2d 508 (Ct. App. 1990).
105. *Tanner v. Shoupe*, 228 Wis. 2d 357, 370, 596 N.W.2d 805 (Ct. App. 1999).
106. *See County of Jefferson v. Renz*, 231 Wis. 2d 293, 297, 603 N.W.2d 541, 543 (1999) and *Zivcic*, 229 Wis. 2d at 127, 598 N.W.2d at 569.
107. WILLIAM SHAKESPEARE, MUCH ADO ABOUT NOTHING.
108. This is indicated by Burns statements in her testimony and reports as well as the determination of the Supreme Court of Ohio in *State v. Homan*. 89 Ohio St. 3d 421, 732 N.E.2d 952 (2000).