

Docket No. 102372.

**IN THE
SUPREME COURT
OF
THE STATE OF ILLINOIS**

THE PEOPLE OF THE STATE OF ILLINOIS, Appellee, v.
JOANNE McKOWN, Appellant.

Opinion filed February 19, 2010.

JUSTICE GARMAN delivered the judgment of the court, with opinion.

Chief Justice Fitzgerald and Justices Freeman, Thomas, Kilbride, Karmeier, and Burke concurred in the judgment and opinion.

OPINION

Following a bench trial in the circuit court of Peoria County, defendant was convicted of two counts of aggravated driving under the influence of alcohol (DUI) (625 ILCS 5/11-501(d)(1)(C) (West 2006)), and other offenses. The appellate court affirmed (*People v. McKown*, No. 3-04-0433 (2006) (unpublished order under Supreme Court Rule 23)), and this court granted her petition for leave to appeal. The single issue raised in her petition was whether she was entitled to a hearing pursuant to the rule of *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923), before evidence of her performance on a horizontal gaze nystagmus (HGN) test could be admitted. We held that the trial court and the appellate court erred in taking judicial

notice that the HGN test is generally accepted as an indicator of alcohol impairment and remanded to the trial court with instructions to conduct a *Frye* hearing. *People v. McKown*, 226 Ill. 2d 245, 248 (2007) (*McKown I*). We retained jurisdiction and now review the trial court's judgment on that issue.

BACKGROUND

Under the rule of *Frye*, scientific evidence is admissible at trial only “if the methodology or scientific principle upon which the opinion is based is ‘sufficiently established to have gained general acceptance in the particular field in which it belongs.’ ” *In re Commitment of Simons*, 213 Ill. 2d 523, 529-30 (2004), quoting *Frye*, 293 F. at 1014. Further, the *Frye* test is necessary only if the scientific principle, technique or test offered by the expert to support his or her conclusion is “new” or “novel.” See *People v. Basler*, 193 Ill. 2d 545, 550-51 (2000).

We held in *McKown I* that “[b]ecause the results of an HGN test require expert interpretation” by a trained police officer, “the results of HGN testing are scientific evidence.” *McKown I*, 226 Ill. 2d at 257. We further held that, despite its use by police officers for many years, “the methodology of HGN testing is novel for purposes of *Frye*.” *McKown I*, 226 Ill. 2d at 258. Thus, a *Frye* hearing was necessary “to determine if the HGN test has achieved general acceptance as a reliable indicator of alcohol impairment.”¹ *McKown I*, 226 Ill. 2d at 257. Finally, although we noted that it was appropriate in some circumstances for a trial court to resolve the question of general acceptance via judicial notice (*McKown I*, 226 Ill. 2d at 254), this

¹We note that this statement in *McKown I* was not intended to graft an additional element of reliability onto the *Frye* test. As we observed in *Donaldson*, “[t]he trial court is not required to conduct a two-part inquiry into both the reliability of the methodology and its general acceptance.” The question of reliability is “subsumed by the inquiry into its general acceptance in the scientific community.” *Donaldson v. Central Illinois Public Service Co.*, 199 Ill. 2d 63, 81 (2002). See also *In re Commitment of Sandry*, 367 Ill. App. 3d 949, 966 (2006) (“once it is determined that a methodology is generally accepted, it follows that it has achieved a sufficient degree of reliability and validity to cross the threshold of admissibility”).

particular issue could not be resolved “on judicial notice alone” (*McKown I*, 226 Ill. 2d at 275). We remanded the matter to the trial court for a *Frye* hearing to determine whether HGN testing is generally accepted in the particular scientific field to which it belongs as an indicator of alcohol impairment and to make findings of fact and conclusions of law as to this question. *McKown I*, 226 Ill. 2d at 276-77.

Nystagmus is “an involuntary, rapid, rhythmic movement of the eyeball, which may be horizontal, vertical, rotatory, or mixed, i.e., of two varieties.” Dorland’s Illustrated Medical Dictionary 1296 (30th ed. 2003). The medical dictionary lists 45 types of nystagmus. For example, ataxic nystagmus is unilateral and occurs in individuals with multiple sclerosis. Dorland’s Illustrated Medical Dictionary 1296 (30th ed. 2003). Congenital nystagmus “may be caused by or associated with optic atrophy, coloboma, albinism, bilateral macular lesions, congenital cataract, severe astigmatism, and glaucoma.” Dorland’s Illustrated Medical Dictionary 1296 (30th ed. 2003). Gaze nystagmus, which is at issue in the present case, is “made apparent by looking to the right or to the left,” as opposed to fixation nystagmus, “which appears only on gazing fixedly at an object,” or latent nystagmus, “which occurs only when one eye is covered.” Dorland’s Illustrated Medical Dictionary 1296 (30th ed. 2003).

The methodology employed by law enforcement officers for conducting an HGN testing as a part of field-sobriety testing is explained in detail in our earlier opinion. In brief, the officer first questions the subject to determine whether he or she has any medical condition or is taking any medication that might affect the results of the test. If not, the officer performs a preliminary test to determine whether the pupils of the subject’s eyes are of equal size and whether the eyes “track” equally as an object is moved, at eye level, from side to side. If so, the HGN test itself is performed. The officer looks for three “clues,” assessing each eye separately. The three clues are lack of smooth pursuit, distinct nystagmus at maximum deviation, and the onset of nystagmus at an angle less than 45 degrees. One point is assigned for each clue that is present in either eye. Thus, the maximum score is six, which would indicate all three clues present in both eyes. A score of four or more is considered “failing” and indicative of alcohol impairment. *McKown I*, 226 Ill. 2d at 249-50.

The Evidence

The *Frye* hearing was held over the course of four dates between March 2007 and April 2008. The State presented the testimony of Dr. Carl Citek, Master Sergeant Antonio Lebron, Dr. Zenon Zuk, and Thomas Page. Defendant presented the testimony of Dr. Joseph Citron, Dr. Ronald Henson, and Dr. Steven Reubenzner. In addition, each party submitted numerous journal articles and other writings in support of its position. Finally, each party submitted a trial brief arguing for certain findings of fact and conclusions of law.

Although the State had the burden on remand of demonstrating that the HGN test meets the *Frye* standard (*People v. Basler*, 193 Ill. 2d 545, 551 (2000)), the presentation of evidence began with the testimony of a witness called by the defendant.

Dr. Joseph Citron testified that he is a board-certified ophthalmologist who received his clinical training at the Mayo Clinic in Rochester, Minnesota. He practices in Atlanta, Georgia, and has over 30 years experience in emergency medical care, including the care of intoxicated patients. In 1999, he completed the National Highway Transportation Safety Administration (NHTSA) training course in field-sobriety testing, which included training in the HGN test. He has 10 years of experience as an instructor on field-sobriety testing for the Atlanta police department and other agencies. He also holds a law degree.

Citron explained the differences in education and training between an ophthalmologist and an optometrist, as well as the fact that an optometrist does not perform surgery or medical diagnosis. He also explained the meaning of the term “nystagmus,” which he described as a condition that is “usually pathologic in origin” and “not part of the normal findings in an individual.” Nystagmus itself is not a diagnosis; it is merely a description of a certain type of eye movement that may be caused by many conditions. He was unable to give a specific number of recognized causes, but agreed with the statement that the number is at least 39. Citron further testified that once an individual had consumed sufficient alcohol to “reach the threshold of central nervous system depression,” he could display nystagmus.

With regard to the HGN test performed by law enforcement officers, Citron explained that the test is not performed in the same

manner as the test a physician would perform during the examination of a patient. He then explained that the NHTSA, which is a division of the United States Department of Transportation, has promulgated standards for performing the HGN test as a field-sobriety test. These standards must be observed “in the same fashion every time by everybody” and individual test results would be invalid if the test were not performed in the “prescribed standardized fashion.” He then made a presentation regarding the proper procedure for performing the HGN test.

Citron testified that based on a “failed” HGN test alone, one could not form an opinion that the cause of the failure was alcohol. The test is a “preliminary test.” It is “the beginning of an evaluation, not the conclusion.” Further, if one offered an opinion that the failure of the test was caused by alcohol, that opinion would be conjecture or speculation. Finally, Citron testified that a failed HGN test is a sign that the subject’s central nervous system (CNS) is depressed. While the cause of CNS depression might be recent consumption of alcohol, the failed test is not an indicator of actual impairment due to alcohol.

On cross-examination by the State, Citron reiterated that HGN can be an indicator of alcohol consumption and that an officer who observes a failed HGN test can “put the presence of alcohol as a central nervous system depressant on a list of possible causes for these findings.”

The State’s case began with the testimony of Master Sergeant Lebron of the Illinois State Police. He holds a bachelor’s degree in law enforcement administration and, as part of his training to become a state trooper, received training in the administration of standardized field-sobriety tests. He testified that he spent 16 years as a patrol officer. Lebron estimated that over the course of his career, he has conducted close to 500 DUI investigations. Prior to taking his current supervisory position, Lebron served as the breath-alcohol section supervisor at the State Police Academy. In this capacity, he was responsible for training new recruits in standardized field-sobriety testing, including administration of the HGN test using the NHTSA manual. A copy of the manual was introduced into evidence.

Lebron described conducting workshops at the Academy during which some volunteers would consume differing amounts of alcohol and others would be given a placebo as a control. The volunteers

would take Breathalyzer tests to measure their blood-alcohol levels. Then the trainees would perform field-sobriety tests on the volunteers. During these workshops, he observed that volunteers who had consumed a sufficient amount of alcohol displayed HGN as well as a degree of reduced motor skills. He has observed 400 to 500 volunteers being examined in such workshops.

He then testified that the HGN test, if performed according to the standardized protocol, is generally accepted in the law enforcement community as a reliable indicator of impairment due to alcohol. After a defense objection, he clarified this statement to say that, in his opinion, a failed HGN test is an indicator that the person has consumed alcohol.

On cross-examination, Lebron acknowledged that he has seen individuals fail all three of the field-sobriety tests when they had absolutely no alcohol in their systems.

Dr. Karl Citek, a professor of optometry at Pacific University College of Optometry in Forest Grove, Oregon, testified for the State. He is involved in training police officers to perform standardized field-sobriety tests and has observed these tests being performed in controlled conditions. On one occasion, he accompanied patrol officers and performed an HGN test in the field. On questioning by defense counsel regarding his expert credentials, he acknowledged that as an optometrist, he was not qualified to diagnose or treat any of the several dozen conditions that may cause nystagmus.

After being accepted as an expert witness, Citek testified that optometrists have a "better feel for the test" than ophthalmologists because "when nystagmus occurs because of an outside influence *** visual function is reduced." He also testified regarding a resolution adopted in 1993 by the American Optometric Association (AOA) House of Delegates endorsing the HGN test as a valid and reliable field-sobriety test. He stated that the resolution was renewed in 2006 and that he agrees with the resolution.

On cross-examination, Citek acknowledged that lack of smooth pursuit could be exhibited by a subject with a blood-alcohol concentration as low as 0.02 and that nystagmus at maximum deviation could be exhibited by a subject with a blood-alcohol concentration as low as 0.04. Thus, a subject could be given a "failing

score” on the HGN test with a blood-alcohol concentration at half the statutory limit of 0.08 (625 ILCS 5/11–501(a)(1) (West 2006)). Citek noted, however, that some individuals could be intoxicated at this level.

With regard to officer training, Citek acknowledged that an officer could pass the standard written test following training in field-sobriety testing by answering 16 of 20 questions correctly and that only four of the 20 questions relate to HGN testing. Thus, an officer could answer all questions concerning HGN testing incorrectly and still receive certification in field-sobriety testing. Citek noted that in addition to passing the written test, officers must perform HGN tests at a live workshop to demonstrate proficiency before being certified. He was unable to answer further questions about the test and the testing procedure because, although he had read the NHTSA training manual, he himself had not completed the training.

On the question of the American Optometric Association resolution, Citek testified that he was not present at the 1993 annual meeting at which the resolution was adopted. He did not know if the resolution was debated prior to being voted upon or how the vote was taken, by head count or by acclamation.

The State next presented the testimony of Dr. Zenon Zuk, medical director of the Los Angeles County/University of Southern California Employee Health Care System. Zuk was previously employed as staff physician at the Los Angeles County jail, where he performed more than 7,000 medical evaluations on arrestees admitted to the jail. These evaluations included an assessment of whether the arrestee was under the influence of alcohol or other drugs.

Zuk testified that, in his opinion, a finding of HGN is generally accepted in the medical community as an indicator of alcohol-induced CNS impairment. If he were to observe HGN during the examination of a patient, he would inquire about the ingestion of drugs and/or alcohol within in the previous 12 to 24 hours. He stated that he could not make a diagnosis solely on the basis of HGN, but that the test is a “linchpin” in determining whether a patient’s CNS is impaired.

He also testified that police officers can be trained to administer the test correctly and to observe the presence of HGN. He opined that the HGN test used by law enforcement is “more rigid,” “more

formal,” and “more methodical” than the HGN test used by physicians.

Zuk stated that there are 35 to 40 different forms of nystagmus and explained at length how these can be distinguished from HGN. On cross-examination, however, he acknowledged that nystagmus might be a symptom of as many as 125 diseases or conditions. He stated on redirect examination that while these conditions could cause nystagmus, it would not manifest “in the exact same way as HGN.” Further, many of the diseases or conditions on this list are rare and perhaps 80% of them would not be seen by a practicing physician “in a lifetime of practice.”

Finally, Zuk acknowledged that the HGN test was originally validated as a test for estimating a person’s blood-alcohol concentration, not as a measure of driving impairment.

Thomas Page testified for the State that he served as a police officer for 22 years in Detroit and Los Angeles. He has administered the HGN test in the field and has observed other officers doing so. He trains police officers and others to perform the test and to interpret the results. He opined that the test is “universally” accepted within the law enforcement community as a reliable indicator of alcohol impairment.

He testified that in his experience, the presence of HGN has corresponded to the presence of an impairing level of alcohol in the subject’s system. He did not, however, provide any data in support of this statement. He acknowledged that he could not speak to the question of general acceptance of HGN testing within the scientific or medical communities.

At the conclusion of the State’s case, the defendant presented her remaining witnesses.

Dr. Ronald Henson is a former police officer who was among the first officers to receive NHTSA training on HGN testing in Illinois. His doctorate is in the field of applied management and decision sciences. He has been an instructor on field-sobriety testing at the Police Training Institute at the University of Illinois and has taught the physiology and pharmacology of alcohol at Bradley University. He is familiar with HGN research, having collected papers and articles on the subject for over 25 years, and he has written and lectured on the subject.

He testified that the test was designed to estimate the subject's blood-alcohol concentration, not to reveal impairment, and that it has not been accepted in the academic community as a reliable indicator of alcohol impairment because it cannot discriminate between those who have merely consumed alcohol and those who have consumed too much.

He further testified to his opinion that Illinois' training of police officers on the subject of field-sobriety testing is inadequate. While the NHTSA recommends a 24-hour course, Illinois devotes only four to six hours to the entire three-test battery of field-sobriety tests. Only one hour is devoted to HGN. Further, the NHTSA-approved written test contains 20 questions on field-sobriety tests while the Illinois test contains six or fewer such questions. Illinois does not require that officers undergo retraining or recertification in field-sobriety testing. Based on his review of videotapes of actual Illinois arrests, he opined that only 1 in 100 field HGN tests is properly administered.

Dr. Steven Rubenzer testified that he is a board-certified forensic psychologist. He has completed both the NHTSA student course and its instructor course. He has published several peer-reviewed articles relating to HGN testing.² Based on a survey of psychologists that he conducted, he testified that HGN testing is not generally accepted in his field as an indicator of intoxication and that there are no academic studies validating the test as a measure of impairment.

He pointed to the lack of peer-reviewed literature on the subject by ophthalmologists and optometrists and to what he described as flaws in the methodology of the original research study on this subject. See M. Burns & H. Moskowitz, *Psychophysical Tests for DWI Arrest*, DOT HS-802 424, June 1977, U.S. Department of Transportation, National Highway Traffic Safety Administration. A later article by Burns stated that a more recent study showed that 20 out of 26 people who failed the test had a blood-alcohol concentration

²Defendant states in her brief that this court "referred to" an article by this witness in its opinion in *McKown I*. While this statement is literally true, we "referred" to the article only as being on her "extensive list of articles that condemn the reliability of HGN testing." *McKown I*, 226 Ill. 2d at 273. We did not, in any sense, endorse or rely on the article.

below 0.08, which he described as a false positive error rate of 67%. He also described a 1981 study showing “interrater reliability” of only 0.66. That is, when the subject was examined by two police officers, the officers’ judgment of impairment was the same in only two-thirds of cases. He opined that a interrater reliability coefficient of less than 0.80 rendered the test unreliable.

On cross-examination, Rubenzer acknowledged that his peer-reviewed article cited a journal called “Journal of Optometry and the Law,” which does not exist. He further acknowledged that he has not conducted any research studies on the HGN test and that he has no medical training. His survey of psychologists was conducted on-line. Of 64 board-certified psychologists who responded to his query, 53 stated that they believed that HGN testing was not generally accepted in their field.

The Trial Court’s Findings of Fact and Conclusions of Law

In brief answer, the trial court concluded that “the clinical HGN test is generally accepted in the scientific world of ophthalmology and optometry as a reliable (preliminary) indicator of alcohol impairment.” While acknowledging that the roadside HGN test as performed by law enforcement officers “has been questioned as to its general acceptance and reliability,” the trial court noted that the “scientific principle itself is unquestioned.” In addition, the trial court found that the HGN test, when properly conducted by a trained police officer, “has been shown to be a sufficiently reliable component of field-sobriety testing that assists the police officer in making the decision to arrest and to formulate an opinion (along with other evidence) of whether a person is operating a motor vehicle under the influence.”

At the conclusion of its summary of the evidence presented, the trial court made five enumerated conclusions of law:

- “1. HGN testing satisfies the *Frye* standard in Illinois.
2. HGN testing is but one facet of field sobriety testing and is admissible as a factor to be considered by the trier-of-fact on the issue of alcohol or drug impairment.
3. A proper foundation must include that the witness has been adequately trained, has conducted testing and assessment in accordance with the training, and that he administered the

particular test in accordance with his training and proper procedures.

4. [Testimony regarding] HGN testing results should be limited to the conclusion that a “failed” test suggests that the subject may have consumed alcohol and *may [have] be[en]* under the influence. There should be no attempt to correlate the test results with any particular blood-alcohol level or range or level of intoxication.

5. In conjunction with other evidence, HGN may be used as a part of the police officer’s opinion that the subject [was] under the influence and impaired.” (Emphasis in original.)

ISSUES PRESENTED

Defendant argues that: (1) the HGN test is not a reliable indicator of impairment due to alcohol and, therefore, does not meet the *Frye* standard; (2) even if the HGN test does meet the *Frye* standard, admissibility of test results should be limited to showing probable cause for arrest; (3) if HGN test results are admissible at trial, the court must strictly enforce standards for performance of the test; (4) police officers who testify regarding HGN test results are testifying as expert witnesses and should not be considered qualified unless they have received extensive training; (5) the trial court’s findings of fact in the *Frye* hearing were erroneous; and (6) the HGN test results should not have been admitted at her trial because the officer did not properly administer the test.

The State responds that the HGN test does meet the *Frye* standard and that use of this evidence should not be limited to establishing probable cause. In response to defendant’s third and fourth arguments, the State argues that this court should adopt the trial court’s foundational requirements for admissibility. The State also argues that defendant has forfeited her final argument by failing to raise the issue in her petition for leave to appeal.

ANALYSIS

At the *Frye* hearing, the burden was on the State to demonstrate that HGN testing is generally accepted in the relevant scientific field as an indicator of alcohol impairment. *People v. Miller*, 173 Ill. 2d

167, 187-88 (1996) (proponent of evidence predicated upon a scientific theory bears the burden of demonstrating that the theory relied upon by the expert has gained general acceptance in the expert's scientific field). We review the trial court's conclusion that the State has met this burden *de novo*. In doing so, we may "consider not only the trial court record but also, where appropriate, sources outside the record, including legal and scientific articles, as well as court opinions from other jurisdictions." *Commitment of Simons*, 213 Ill. 2d at 531.

We note that the various witnesses, although knowledgeable and experienced, were not altogether objective. Each has a stake of some sort in the outcome of this debate. Thus, we are guided more by the points on which they agree than by any points of disagreement.

Challenge to the Trial Court's Findings of Fact

Defendant argues that the findings of fact upon which the trial court's conclusion was based are erroneous. She takes particular exception to the trial court's uncritical acceptance of the American Optometric Association's resolution and its reliance on case law from other states that predates some of the more current scientific literature.

In its written findings of fact, the trial court stated that the "long-standing resolution of the American Optometric Association declaring the HGN test 'to be a scientifically valid and reliable tool for trained officers to use in field sobriety testing' is compelling evidence showing a sufficient consensus in the scientific community to allow HGN testimony in Illinois courts."

The resolution was introduced into evidence via the testimony of Citek, who, on cross-examination, could provide no background information regarding the purpose for which it was proposed, the circumstances under which the resolution was adopted, or the debate, if any, over the proposal.

The American Optometric Association is a professional organization, not a scientific body. Its goals are to set professional standards, lobby government and other organizations on behalf of the profession, and to provide leadership for research and education. See <http://www.aoa.org> (last visited February 1, 2010). According to Citek's testimony, not all members of the profession are members of

the Association.

We do not believe that a resolution adopted by the members of a professional organization can be considered evidence of consensus among the members of that profession. Of the 36,000 actual members, it is likely that a fraction were present at the American Optometric Association House of Delegates in 1993 when this resolution was adopted and when it was subsequently reaffirmed. The record contains no information as to the number of members voting for or against the resolution. Thus, rather than expressing general acceptance, the resolution expresses the opinion of a relatively small number of members of the profession.

Further, the purpose of the American Optometric Association resolution was to urge doctors of optometry to “become involved as professional consultants in the use of HGN field sobriety testing.” Thus, rather than expressing a considered professional opinion on the science underlying HGN testing, the resolution expressed an interest in urging members to take advantage of a professional opportunity being created by the emerging acceptance of HGN testing by law enforcement agencies.

Thus, we agree with the defendant on this point and give no weight whatsoever to the Association’s resolution.

Each party provided the trial court with journal articles and other literature in support of its position. The State introduced into evidence a volume entitled “DWI Detection and Standardized Field Sobriety Testing” (cited therein as DOT HS 178 R2/06), published by the NHTSA as a training manual for students participating in training for field-sobriety testing. Six pages of the volume are devoted to the subject of nystagmus. The volume outlines a 10-step procedure for performing a field test for HGN. DOT HS 178 R2/06, at VIII-7.

The volume also contains a bibliography listing 34 “Scientific Publications and Research Reports Addressing Nystagmus.” The actual reports and publications are not included. Given this lack of content regarding the science underlying HGN field testing, we find nothing in this volume relevant to the question of general acceptance in the relevant scientific field.

The State also submitted journal articles by several of its expert witnesses and others on the subject of HGN testing and the

relationship of HGN to impairment due to consumption of alcohol or other drugs. Many of these publications were prepared under contract to the NHTSA.

In addition, the State provided the report of the initial 1977 laboratory study that has served as the basis for the widespread adoption of HGN field testing. The study was sponsored by the NHTSA for the purpose of evaluating the field-sobriety tests being used by police officers at that time, identifying tests that would provide the most reliable evidence of a blood-alcohol concentration above the legal limit, and standardizing the procedures for administering these tests. M. Burns & H. Moskowitz, *Psychophysical Tests for DWI Arrest*, DOT HS-802 424, June 1977, U.S. Department of Transportation, National Highway Traffic Safety Administration. Ten officers administered a battery of six tests, including HGN, to 238 subjects. Some of the subjects were given alcohol prior to testing; others were given a placebo. The subjects' blood-alcohol concentrations were measured and shown to be in the zero to 0.15 range. The officers were instructed to arrest any subject they believed to have a blood-alcohol concentration of 0.10 or higher, based on the results of six field-sobriety tests. They made correct arrest decisions in 76% of cases. Analysis of the data led to the recommendation that accuracy could be improved by reducing the number of tests to a battery of three: one-leg stand, walk-and-turn, and HGN.

Based on our review of the initial study and the other articles provided by the State, several themes emerge. First, alcohol and CNS-depressant drugs affect the neural centers in the brain that control eye movements, as well as other centers of the brain. Second, HGN correlates highly with both an elevated blood-alcohol concentration and with cognitive impairment. Third, an individual may fail the HGN test by showing 4 or more clues despite a blood-alcohol concentration below the legal limit for driving. Such a person may or may not be impaired for driving. Fourth, to be a reliable indicator of alcohol consumption, HGN field testing must be performed in accordance with the NHTSA protocol. Fifth, police officers can be trained to distinguish HGN due to consumption of alcohol or other substances from some other common forms of nystagmus.

Defendant argues that the literature she provides is more current than that relied upon by the State and that, as a result, it calls into

doubt continued reliance on HGN testing as a field-sobriety test, despite acceptance by several state courts in the years after the initial 1977 study.

Several articles written by expert witness Rubenzer are provided. The articles are descriptive, in that they summarize research done by others rather than report on independent research. In brief summary, these articles conclude that HGN testing is being improperly used by law enforcement. The HGN field test was originally developed by Burns and others as a tool to screen drivers to determine whether blood-alcohol concentration testing was justified. The test was not designed to determine whether the subject is impaired for driving and its use for this purpose has not been validated by controlled studies. Further, Rubenzer asserts that the developers of the test, along with prosecutors, have “oversold” the test.

Among the other articles provided by defendant, several are taken from defense-oriented journals and others from the Web sites of attorneys who engage in DUI defense practice.

While the points made by Rubenzer and others are worth noting, we find nothing in the materials provided by defendant to contradict the five general points listed above that we found supported by the literature provided by the State.

In sum, while we agree with defendant that the American Optometric Association’s resolution is not worthy of consideration under *Frye*, we reject her assertion that the trial court’s findings of fact are erroneous. In any event, because we are engaged in *de novo* review, we are not bound by those findings.

Relevant Scientific Field

A review of the evidence presented reveals that HGN is a physical sign that reveals, among other things, the existence of CNS depression. Thus, the underlying basic science is the physiology of the CNS. Practitioners such as neurologists, ophthalmologists, and optometrists are trained to perform this test in a clinical setting and to observe the results and, in the case of physicians, to diagnose and treat conditions that cause nystagmus.

As noted above, in the 1970s, the NHTSA sponsored research by psychologist Dr. Marcelline Burns of the Southern California

Research Institute into the reliability of field-sobriety testing. Based on her research, which found a correlation between the ingestion of alcohol and the presence of HGN, law enforcement agencies adopted this clinical test for use as a field-sobriety test.

Lebron and Page testified that HGN testing is generally accepted within the law enforcement community as a field-sobriety test. Law enforcement, however, is not a scientific field. Therefore, general acceptance within law enforcement circles cannot be the basis for finding scientific evidence admissible under *Frye*.

The trial court found that the relevant scientific fields to which the HGN test belongs are optometry and medicine, specifically the medical specialty of ophthalmology.

We agree with the trial court that the relevant scientific fields that embrace the testing for and observation of HGN include medicine, ophthalmology, and optometry. Research and expert opinion in other scientific or medical fields, such as neurophysiology, might also be relevant.

Thus, the question of general acceptance must be determined from the testimony of experts and the literature in these scientific fields, and not from the testimony or writings of law enforcement officers or agencies.³ Similarly, despite Dr. Henson's years of experience, his

³Some Illinois cases have phrased the *Frye* test in terms that would seem to require the expert witness whose testimony is used to admit the scientific evidence at trial to be a member of the scientific field to which the scientific evidence belongs. See, e.g., *In re Marriage of Gambla*, 367 Ill. App. 3d 441, 460 (2006) (stating that under *Frye*, "the proponent of expert testimony predicated upon a scientific theory must establish that the theory has gained general acceptance in *the expert's* scientific field" (emphasis added)).

This has never been a requirement under *Frye*, which requires the court to determine whether the science underlying a witness's testimony is generally accepted in *the relevant scientific field*. Whether the testifying witness is qualified to give the scientific testimony is a separate question.

Thus, a police officer trained as an accident-reconstruction expert may be qualified to testify regarding the use of certain principles of physics to determine how fast a vehicle was traveling at the moment of impact, even though the expert is not a physicist. So long as the scientific principles being applied are generally accepted in the field to which they belong—physics—the

professional credentials do not qualify him as an expert on the general acceptance of HGN testing for the purpose of alcohol impairment within these scientific fields.

General Acceptance

Defendant argues that the presence of HGN is not a reliable indicator of impairment due to alcohol. She points to testimony that the presence of HGN correlates with blood-alcohol concentrations of 0.04 to 0.06, which is lower than the statutory definition of intoxication. The State responds that defendant was not charged with driving with a blood-alcohol concentration over the legal limit (625 ILCS 5/11-501(a)(2) (West 2006)); she was charged with aggravated DUI (625 ILCS 5/11-501(d)(1)(C) (West 2006)), and that a driver may be impaired with a blood-alcohol concentration below 0.08.

Defendant also argues that an individual may fail the HGN test due to as many as 125 conditions unrelated to alcohol ingestion. The State answers that the testimony clearly shows that the eye movements elicited by the HGN test are readily distinguishable from other forms of nystagmus and that these differences are obvious to a properly trained observer.

These points of disagreement and the issues raised at oral argument reveal that before we can determine whether a scientific principle is generally accepted, we must define the purpose for which it is being used at trial. Our remand for a *Frye* hearing directed the trial court to determine whether a failed HGN test was generally accepted in the relevant scientific community *as an indicator of impairment due to alcohol*. *McKown I*, 226 Ill. 2d at 276.

The testimony by witnesses for both parties consistently stated that the presence of the physical sign of HGN is indicative of CNS depression due to the consumption of alcohol. This sign may also indicate some other form of CNS depression. There is also general

otherwise qualified expert may testify regarding those principles.

Similarly, our conclusion that the science of HGN testing belongs to the fields of medicine and optometry for purpose of the *Frye* hearing does not preclude a police officer from testifying regarding the performance of the test and the results observed.

agreement among the testifying experts that when the subject has consumed alcohol, HGN is not necessarily a sign of impairment as a result of that alcohol consumption.

The trial court concluded that “both ophthalmology and optometry generally accept the principle that the HGN test may be an indicator of alcohol consumption.” The trial court stated, further, that the use of HGN test results at trial “should be limited to the conclusion that a ‘failed’ test suggests that the subject may have consumed alcohol and may [have] be[en] under the influence. There should be no attempt to correlate the test results with any particular blood-alcohol level or range or level of intoxication.”

We agree. Consumption of alcohol is a necessary precondition to impairment due to alcohol. Therefore, any evidence of alcohol consumption is relevant to the question of impairment. See *People v. Beaman*, 229 Ill. 2d 56, 75-76 (2008) (stating that evidence is relevant if it tends to make the existence of any fact in consequence more or less probable than it would be without the evidence); Black’s Law Dictionary 1404 (9th ed. 2009) (defining relevant as “[l]ogically connected and tending to prove or disprove a matter in issue”). A failed HGN test is relevant to impairment in the same manner as the smell of alcohol on the subject’s breath or the presence of empty or partially empty liquor containers in his car. Each of these facts is evidence of alcohol consumption and is properly admitted into evidence on the question of impairment.

We, therefore, adopt the trial court’s finding that HGN testing is generally accepted in the relevant scientific fields and that evidence of HGN test results is admissible for the purpose of proving that a defendant may have consumed alcohol and may, as a result, be impaired.

Decisions of Our Sister States

Our conclusion that HGN testing is generally accepted is consistent with that of other states that have conducted *Frye* hearings on this question. See *Ballard v. State*, 955 P. 2d 931 (Alaska App. 1998) (HGN test results admissible to show that a defendant has consumed alcohol and is potentially impaired); *State v. Superior Court*, 149 Ariz. 269, 718 P.2d 171 (1986) (holding that with proper

foundation, testimony regarding nystagmus is admissible as evidence that a defendant was driving while under the influence of alcohol); *People v. Joehnk*, 35 Cal. App. 4th 1488, 42 Cal. Rptr. 2d 6 (1995) (when combined with results of other field-sobriety tests and with the officer's observations, HGN is a useful tool in reaching opinion as to whether a defendant is intoxicated); *State v. Klawitter*, 518 N.W.2d 577 (Minn. 1994) (HGN testing satisfies *Frye* test); *State v. Baue*, 258 Neb. 968, 607 N.W.2d 191 (2000) (HGN evidence admissible for limited purpose of showing the defendant had an impairment that may have been caused by alcohol, but not admissible for proving blood-alcohol concentration in excess of legal limit); *State v. Baity*, 140 Wash. 2d 1, 991 P.2d 1151 (2000) (use of HGN as forensic test to determine intoxication satisfies *Frye*).

Defendant argues that reliance on these cases is misplaced either because the cases have been undermined by later developments or because the *Frye* issue was not as fully litigated, as it has been in the present case. Because we do not rely on these cases as support for our holding, but merely acknowledge that our conclusion is consistent with them, we reject defendant's argument that our reliance on these cases is misplaced.

Limits on Admission of HGN Evidence at Trial

Defendant argues that the use of HGN evidence should be limited to use at a preliminary hearing to establish probable cause to arrest. She argues that the HGN test is not sufficiently reliable to be used as evidence of guilt because it does not prove impairment beyond a reasonable doubt. Defendant cites no authority for imposing such a limitation but urges this court, as "gatekeeper of evidence," to declare that HGN test results may not be used at trial.

Defendant overlooks the threshold requirement of relevance. Each individual item of evidence does not have to prove the fact at issue beyond a reasonable doubt. Rather, each individual item of evidence must tend to show that the fact at issue, in this case impairment due to alcohol, is more or less likely. By way of analogy, it is often said that " 'a brick is not a wall.' " Fed. R. of Evid. 401, Advisory Committee's Note, quoting C. McCormick, *Handbook of the Law of Evidence* §152, at 317 (1954). That is, an individual item of evidence

is merely a brick, one of many bricks used to build the wall that is the fact at issue.

The police officer's testimony regarding the results of a defendant's failed HGN test tends to show that he or she consumed alcohol prior to being tested. Similarly, testimony that a defendant did not display any sign of HGN is relevant evidence that tends to show that he or she had not consumed alcohol. The result of the test, therefore, makes it either more or less likely that a defendant was impaired due to alcohol.

This is the concern addressed by the trial court's conclusion that the use of HGN evidence should be limited to proof of alcohol consumption and the possibility of resulting impairment. Limitation may take the form of sustaining an objection to certain questions or arguments made by the prosecutor, giving a limiting instruction at the time the testimony is given, or giving a written jury instruction at the conclusion of the case. The need for a limitation on the use of the evidence, however, is not a basis for finding the evidence inadmissible at trial under the test of *Frye*.

We, therefore, reject defendant's invitation to limit the use of this relevant piece of evidence to showing probable cause.

Defendant also argues that despite its relevance, a failed HGN test result "proves too much" because of its "aura" of scientific certainty. In effect, she is arguing that the risk of undue prejudice from this evidence substantially outweighs its probative value. See *People v. Walker*, 211 Ill. 2d 317, 337 (2004) ("Illinois courts have long recognized, as a matter of common law, that a trial court may exercise its discretion to exclude evidence, even when it is relevant, if its prejudicial effect substantially outweighs its probative value").

This balancing of risk of prejudice versus probative value is not performed across the board. It is necessarily a case-by-case analysis. Our finding that HGN evidence meets the *Frye* standard does not preclude the possibility that, in a given case, the trial court might rule such evidence inadmissible on grounds of undue prejudice.

Defendant also asserts that there is insufficient oversight of police officers who administer the HGN test in the field, particularly with regard to their qualifications and their ability to interpret the test results. She argues that field studies and anecdotal evidence suggest

that the “vast majority” of police officers improperly perform the test in arrest situations. In light of this, she argues for more extensive training of police officers and for stricter standards regarding the procedure for performing the test in the field. Specifically, she claims that if HGN evidence does meet the *Frye* standard, the only acceptable method for administering the HGN test by a police officer is the NHTSA method.

This argument merges two separate questions: first, the proper method for conducting HGN testing in the field and, second, the qualifications of the witness who will testify regarding the HGN test results.

The trial court framed the question before it on remand in terms of the general acceptance of the “NHTSA roadside HGN test.” The evidence presented by both parties was geared toward the test as developed and taught by the NHTSA. Thus, the trial court’s ruling on the *Frye* issue necessarily imported the NHTSA standard testing protocol. Our adoption of the trial court’s conclusion is similarly limited.

We hold that evidence of HGN field-sobriety testing, when performed according to the NHTSA protocol by a properly trained officer, is admissible under the *Frye* test for the purpose of showing whether the subject has likely consumed alcohol and may be impaired.

As for the qualifications of the individual witness, the trial court concluded that a proper foundation must be laid, including a showing that the witness is properly trained and that he performed the test in accordance with proper procedures.

We agree. A properly trained police officer who performed the HGN field test in accordance with proper procedures may give expert testimony regarding the results of the test. We also agree with the trial court’s conclusion that a testifying officer may use the HGN test results as a part of the basis for his opinion that the defendant was under the influence and impaired.

In sum, we affirm each of the trial court’s five conclusions of law.

Whether the HGN Test Was Properly Administered by the Officer in This Case

Defendant’s final argument is that even if evidence of HGN field

testing is generally admissible under *Frye*, the evidence should not have been admitted against her because the test was not administered by Officer Klatt in compliance with NHTSA standards. Specifically, she argues that Klatt did not testify that he checked her eyes for equal tracking before conducting the HGN test. He did not testify that he checked her eyes for equal pupil size. He did not describe the speed at which he moved the stylus or that he held the stylus at the point of maximum deviation for the requisite four seconds. He did not testify that he repeated the procedure twice, as NHTSA protocol requires. Finally, he confused two of the clues when he combined two steps in the protocol. As a result, defendant argues, Klatt's testimony regarding the HGN test should have been excluded and, further, he should not have been allowed to express an opinion that she was impaired because his opinion was necessarily based on the result of the improperly performed test. She argues further that because the trial court relied "heavily" on this evidence, her conviction should be reversed. Finally, she argues that a new trial is barred by double jeopardy.

The State argues that defendant forfeited any argument on this issue by failing to raise it at trial and in a posttrial motion. *People v. Enoch*, 122 Ill. 2d 176, 186 (1988). The State notes that because the defendant failed to raise this issue at trial, it was deprived of the opportunity to cure any defect in the officer's foundation testimony at that time. *People v. Bush*, 214 Ill. 2d 318, 333 (2005).

In her brief to the appellate court, defendant argued that the State failed to present an adequate foundation for the results of her HGN test to be admitted. She did not argue that trial counsel was ineffective for failing to make a timely objection and to raise the issue in a posttrial motion. She did not argue that admission of the officer's testimony regarding HGN was plain error.

The State, however, failed to bring defendant's forfeiture of the issue to the attention of the appellate court. In effect, the State forfeited its ability to argue forfeiture by the defendant. *People v. Williams*, 193 Ill. 2d 306, 347 (2000) (doctrine of forfeiture applies to the State as well as to the defendant and State may forfeit claim that the defendant forfeited an issue by not properly preserving it for review).

The appellate court addressed the issue on the merits, finding that

a sufficient foundation was presented for the admission of the test result.

In her petition for leave to appeal, defendant raised only the single issue of the necessity for a *Frye* hearing. On this issue, she prevailed and was granted remand for a *Frye* hearing.

At the *Frye* hearing, defense counsel attempted to question Dr. Citron as to whether Klatt correctly performed the HGN test according to NHTSA standards. The State objected. Counsel explained that his position was that while an HGN test performed according to these standards might meet the *Frye* standard for admissibility, the test as performed by the officer in this case did not meet the *Frye* standard. The trial court sustained the objection, reasoning that if the *Frye* hearing had been held at trial, the question of admissibility of HGN testing in general would have been resolved prior to the receipt of the officer's testimony. Thus, the question on remand was to be answered as a general matter. Any question regarding the admissibility of a specific test in an individual case was one to be answered at trial. Defense counsel was allowed to make an offer of proof. Citron testified that he had reviewed the transcript of Officer Klatt's testimony and that the examination as described by Klatt did not follow the NHTSA standardized protocol for HGN testing. As a result, he opined, the test was invalid.

Similarly, defense counsel was allowed to make an offer of proof during cross-examination of Master Sergeant Lebron. Lebron reviewed the transcript of Officer Klatt's trial testimony and stated that Klatt performed the test while defendant was seated; while the NHTSA manual requires that the subject be standing. Further, Klatt's testimony does not indicate that he questioned defendant about any eye problems, equal tracking, equal pupil size, or resting nystagmus. Lebron stated that he "would agree" with the statement that Klatt did not perform the test in accordance with NHTSA standards.

During its cross-examination of Dr. Citek, the defense again made an offer of proof regarding the manner in which Klatt conducted the HGN test in this case. Citek acknowledged that the officer's testimony did not state that he observed equal pupil size and equal tracking before he conducted the HGN test and that if the officer did skip these steps, the test results would not be reliable.

Page acknowledged that the HGN test must be performed according to NHTSA standards to be considered reliable as a field-sobriety test and that he has seen trained police officers administer the test incorrectly. He agreed that Klatt's trial testimony did not correctly describe the clues one observes when administering the HGN test.

Dr. Henson reviewed Klatt's testimony and stated based on that testimony, the test Klatt performed was not in compliance with NHTSA standards.

Notwithstanding the testimony on remand in which even the State's witnesses found Klatt's testimony insufficient to lay the foundation for HGN evidence, the State argues that because defendant failed to raise the issue in her petition for leave to appeal, she again forfeited any claim that the foundation for the officer's testimony regarding her HGN test results was insufficient. *People v. Carter*, 208 Ill. 2d 309, 318 (2003) (failure to include an issue in a petition for leave to appeal results in forfeiture of that issue for review).

The State is correct that an issue may be deemed forfeited if a petitioner fails to raise it in his petition for leave to appeal. However, as we explained in *In re Rolandis G.*, 232 Ill. 2d 13, 37 (2008), "the failure to raise an issue in a petition for leave to appeal is not a jurisdictional bar to this court's ability to review a matter."

Whether to review a forfeited issue under these circumstances is within this court's discretion. *Rolandis G.*, 232 Ill. 2d at 37. We have established a clear framework for the exercise of such discretion. When an issue is not specifically mentioned in a party's petition for leave to appeal, but it is " 'inextricably intertwined' " with other matters properly before the court, review is appropriate. *Rolandis G.*, 232 Ill. 2d at 37, quoting *Hansen v. Baxter Healthcare Corp.*, 198 Ill. 2d 420, 430 (2002). If, however, the forfeited issue is not inextricably intertwined with the issues properly before the court, the forfeiture rule should be given effect.

The issues properly before this court in the present appeal are whether, in general, evidence regarding HGN testing of a defendant in a DUI prosecution is admissible under the *Frye* test and, if so, what circumstances must be present before such evidence may be admitted in a specific case. We conclude that the forfeited question is inextricably intertwined with the issues that we have addressed herein,

particularly given the clear record Klatt's testimony did not meet the standards we have now adopted.

Admission of Klatt's testimony regarding the HGN test he performed in the absence of a proper foundation was error. Error will be deemed harmless and a new trial unnecessary when "the competent evidence in the record establishes the defendant's guilt beyond a reasonable doubt and it can be concluded that retrial without the erroneous admission of the challenged evidence would produce no different result." *People v. Arman*, 131 Ill. 2d 115, 124 (1989).

In *McKown I*, we rejected the State's argument that if denial of a *Frye* hearing was error, it was harmless error. "Given the fact[s] that defendant's blood-alcohol content was not verified by any chemical test, and no other field-sobriety tests were given," we found it "reasonable to conclude that the trial court relied heavily on the improperly admitted HGN test results." *McKown I*, 226 Ill. 2d at 276. In light of our earlier decision, defendant's conviction must be reversed.

We must now consider whether a new trial would subject defendant to double jeopardy. See *People v. Jones*, 175 Ill. 2d 126, 134 (1997); *People v. McDonald*, 125 Ill. 2d 182, 201 (1988). If the evidence presented at the first trial, including the improperly admitted evidence, would have been sufficient for any rational trier of fact to find the essential elements of the crime proven beyond a reasonable doubt, retrial is the proper remedy. *People v. Lopez*, 229 Ill. 2d 322, 367 (2008). If no rational trier of fact could so find, defendant may not be subjected to a second trial.

In her brief, defendant argues that because the results of her HGN test should not have been admitted into evidence, Klatt's opinion, which was based in part on the test results, should also be excluded and that remand for a new trial would, therefore, violate double jeopardy. She offers no authority for the proposition that an opinion witness who is barred from testifying regarding one fact that entered into the formation of his opinion is barred from giving an opinion altogether. Further, she offers no authority for the proposition that a police officer cannot testify to the facts and circumstances he observed while investigating an accident.

We agree with the State that a new trial is proper. There is no bar

to the officer's testifying regarding the facts and circumstances he observed while investigating the accident. In addition, the officer's opinion regarding defendant's state of intoxication was supported by other facts in the record, aside from her performance on the HGN test.

Klatt testified that defendant had already been transported from the scene when he arrived. He found a partially full can of beer in her car. He spoke to defendant later at the hospital and observed that her speech was slurred, her eyes were bloodshot, and she had a strong odor of beer on her breath. Although she initially denied drinking that day, she later admitted to him that she had consumed two cans of beer before leaving her house, another can while driving, and had opened a fourth can just prior to the accident. She also stated that she had slept only four hours the previous night. At that point, Klatt performed the HGN test. Because defendant was seated in a hospital bed, he was unable to perform other field-sobriety tests.

There was sufficient information in Klatt's possession prior to his conducting the HGN test to allow him to form an opinion regarding defendant's impairment due to alcohol. At the time he interviewed defendant, he already suspected her of driving under the influence based on the statements of the other witnesses and the open can of beer he found in her car. Her speech, eyes, and breath confirmed his suspicion. Her admission that she had consumed three cans of beer and was in the process of consuming a fourth can, after having only four hours of sleep, provided further confirmation. The result of the HGN test he performed may have merely provided additional support for his opinion. We conclude that Klatt may testify regarding these other facts and to the opinion he formed based on these facts.⁴

In addition, three witnesses other than the officer testified regarding the accident. Randall Retherford, another motorist, testified that he drove his truck onto the shoulder of the road to avoid the defendant's car, which was approaching him at high speed. He saw

⁴We note also that while the admission of the HGN test results in this case was error, it was error because the State did not lay the proper foundation, not because HGN test results are inadmissible in general. Thus, if the State can lay the proper foundation for Klatt's testimony on remand, the test results will be admissible.

the defendant's vehicle "lock up its wheels, veer to the left," and hit three on-coming motorcycles.

His testimony was corroborated by one of the injured riders, Robert Stanley, who testified that as he lay on the ground after being thrown from his motorcycle, defendant approached him and offered to help him remove his helmet. He testified that he smelled the odor of beer on her breath.

Another cyclist who was not involved in the accident, Chad Morris, testified that he heard squealing tires and saw defendant's car veering into his lane, sliding sideways into the oncoming motorcycles. He was able to stop in time to avoid being hit.

Viewing the testimony of these witnesses, in combination with the admissible portion of Officer Klatt's testimony, in the light most favorable to the prosecution (see *People v. Diggins*, 235 Ill. 2d 48, 58 (1999)), there was sufficient evidence from which the trial court could have found defendant guilty of aggravated driving under the influence of alcohol beyond a reasonable doubt and, thus, double jeopardy does not preclude a new trial. See *People v. Hope*, 116 Ill. 2d 265, 279 (1986). However, we note that nothing in this opinion should be construed as a finding regarding defendant's guilt that would be binding upon remand.

Defendant argued in *McKown I* that the odor of alcohol on her breath merely indicated that she had consumed alcohol, not that she was impaired. She also argued that her bloodshot eyes could be explained by her recent overnight shift working in a chemical plant. These are arguments better addressed to the trier of fact. She is free to make these arguments at her new trial.

CONCLUSION

In sum, we adopt the trial court's findings on remand that HGN testing is generally accepted in the relevant scientific fields as evidence of alcohol consumption and possible impairment. We also adopt the trial court's five conclusions of law regarding the admission of HGN evidence and its use at trial. The admissibility of HGN evidence in an individual case will depend on the State's ability to lay a proper foundation and to demonstrate the qualifications of its witness, subject to the balancing of probative value with the risk of unfair prejudice.

We find that admission of the officer's testimony regarding HGN testing in this case was reversible error. Thus, we reverse the judgments of the appellate and circuit courts and remand the cause to the circuit court for a new trial.

*Judgments reversed;
cause remanded.*