

TOWARD A RATIONAL POLICY FOR DEALING WITH MARIJUANA IMPAIRMENT – MOVING BEYOND “HE LOOKED BUZZED TO ME, YOUR HONOR”

William J. McNichol, Jr.*

I. INTRODUCTION

This paper examines how marijuana impairment is currently proven, especially in states where marijuana has been legalized under state law. Much of the currently used proofs and some legislatively imposed standards are scientifically unsound and their use should be discontinued or severely limited. It is recommended that development of a valid biochemical proxy for marijuana impairment should be a priority funding item in states where marijuana is legalized.

II. MOVING FROM PROHIBITED USE/POSSESSION TO IMPAIRMENT

Marijuana,¹ at least for purposes of some states’ laws, is moving from a “Prohibition Regime” to a “Regulated Use Regime.” Under a Prohibition Regime the mere possession and/or use of marijuana is illegal.² Under a Regulated Use Regime, the possession and use of marijuana is legal, provided that this is done in compliance with certain regulations. This shift in the legal status of marijuana reflects a judgement that, on balance, the social costs of Prohibition (e.g. large underground criminal enterprises, significant penal consequences) outweigh the social costs of regulated use. It is generally accepted that marijuana can adversely affect a person’s ability to perform certain activities, such as driving³ and that this is one of the important social costs that is part of this balancing process.

* Adjunct Professor, Rutgers Law School. Member of the New York and Washington bar.

¹ This paper adopts the definition of marijuana used in the Controlled Substances Act. 21 U.S.C. § 802(16).

² Under federal law, marijuana is subject to a Prohibition Regime. 21 U.S.C. § 812. Merely possessing marijuana is a federal crime, subject to varying penalties depending on the quantity possessed and whether the marijuana is possessed for the purpose of distributing it.

³ This paper will focus on driving an automobile while impaired. Driving is not the only context in which impairment is important. The social costs of impairment by persons in hazardous occupations, (e.g. demolition operations, and operating construction equipment), teaching and counseling positions, and transportation jobs (e.g. pilots, and railroad engineers) makes impairment in those situations a matter of public concern. Also, many private relationships (e.g. child custody

A Prohibition Regime can deal with the problem of drivers who are marijuana impaired in several ways, most prominently by simply enforcing the legal prohibition against the possession and/or use of marijuana. If the driver of an automobile can be shown to have used or to be in possession of marijuana, then the driver is subject to criminal penalties, just as would anyone else who possessed or used marijuana under the Prohibition Regime. This can serve to deter the operation of cars while impaired by marijuana.

Regulated Use Regimes cannot deal with the problem of persons who operate cars the same way that a Prohibition Regime can. A person who possesses and uses marijuana is not subject to criminal liability in a Regulated Use Regime unless a specific regulation is violated. A policy tool other than prohibition penalties must be used to deal with persons who operate cars while using marijuana.

The regulation of alcohol is an obvious precedent for how to deal with marijuana impairment in a Regulated Use Regime. Much of the language used to describe marijuana control regimes (e.g. “prohibition”) was taken from experience with alcohol. Many state laws creating recreational or “adult use” Regulated Use Regimes explicitly invoke alcohol regulation as precedent and purport to regulate marijuana in a manner similar to the way alcohol is regulated.⁴

Prescription drugs are another possible precedent for how to deal with marijuana in a “medical marijuana” Regulated Use Regime. State laws authorizing medical marijuana purport to regulate marijuana as a medicine⁵ and some are cast in terms of interim measures until marijuana is federally recognized as a medicine.⁶

Whether one relies upon alcohol or on prescription drugs as guides for how to deal with persons using marijuana while driving, the result is the same. The central issue becomes *impairment*,⁷ not use.⁸ That is, the law imposes penalties only when the use of the regulated substance (e.g. marijuana) diminishes a person’s ability to function to such a degree that the person must not be allowed to drive a car. By definition, this is a question of

arrangements and many workplace rules) can be affected by impairment and are a matter of great concern to the parties involved. While this paper will not discuss impairment in these contexts, the problems discussed here, and the solutions offered, are likely to be widely applicable.

⁴ See, e.g., 410 ILL. COMP. STAT. 705/1-1 (2020); NEV. REV. STAT. 453D.020 (3); CO. CONST. art. XVIII, § 16 (1)(b).

⁵ See, e.g., 35 PA. STAT. AND CONS. STAT. ANN. § 10231.102 (2016); N.J. STAT. ANN. 24 § 6I-2 (2019).

⁶ 35 PA. STAT. AND CONS. STAT. ANN. § 10231.102(4) (2016).

⁷ This paper uses the terms impaired and impairment to refer to a condition that is also sometimes called “under the influence” or “intoxicated” or “incapable of safely operating.”

⁸ It should be remembered that even the most permissive Regulated Use regimes contain some strict prohibitions. For example, Regulated Use regimes that allow recreational use almost always strictly prohibit possession and use by underage persons. See, e.g., NEV. REV. STAT. 453D.020 (West 2016) (repealed); CA. BUS. & PROF. §§ 26030, 26140; 410 ILL. COMP. STAT. 705/1-1 (2020).

the magnitude of the effect that regulated substance has on the person at the time in question, and does not turn on the mere use of the regulated substance.

Each state expresses this question concerning the magnitude of the effect that a substance has on a person in slightly different terms, but they all reach generally similar endpoints. In Illinois, the statute provides that “[a] person shall not drive or be in actual physical control of any vehicle within this State while . . . under the influence of any other drug or combination of drugs to a degree that renders the person incapable of safely driving.”⁹ This has been interpreted to mean that “[i]t is not enough for the State to show drug use by the defendant; the State must also show that the defendant could not drive safely under the drugs found in his system.”¹⁰

In New Jersey, the statute provides the following:

[A] person who operates a motor vehicle while under the influence of intoxicating liquor, narcotic, hallucinogenic or habit-producing drug, . . . or permits another person who is under the influence of intoxicating liquor, narcotic, hallucinogenic or habit-producing drug to operate a motor vehicle owned by him or in his custody or control . . . shall be [guilty of driving while intoxicated].¹¹

The New Jersey Supreme Court has explained that intoxication refers to “a substantial deterioration of the mental faculties or physical capabilities of a person . . . which so affects the judgement of the motor vehicle operator as to make it improper for him to drive on the motorway.”¹²

In New York, impairment has been described as when a person “is incapable of employing the physical and mental abilities which he is expected to possess in order to operate a vehicle as a reasonable and prudent driver.”¹³

Some states, like Arizona, do not define impairment and this can lead to some confusion. Arizona prohibits driving when “impaired to the slightest degree.”¹⁴ The statute’s reference to a “slightest degree” of impairment does not eliminate the requirement that impairment exist. Indeed, Arizona’s Medical Marijuana Act specifically provides that, when prosecuted under the impaired driving statute, medical marijuana users can defend on the ground that they are not actually impaired, even though they have certainly used marijuana.¹⁵ The Arizona courts have acknowledged that the mere presence of THC in the defendant’s blood is not determinative of liability under the impaired driving statute and that the defendant can avoid liability with “proof

⁹ 625 ILL. COMP. STAT. § 5/11-501(a)(4) (2020).

¹⁰ *People v. Cibrowski*, 55 N.E. 3d 259, 283 (Ill. App. Ct. 2016).

¹¹ N.J. STAT. ANN. § 39:4-50(a) (2019).

¹² *State v. Bealor*, 902 A. 2d 226, 235 (N.J. 2004) (internal citations omitted).

¹³ *People v. Cruz*, 399 N.E.2d 513; 48 N.Y.2d 419 (1979).

¹⁴ ARIZ. REV. STAT. ANN. § 28-1381(A)(1) (2019).

¹⁵ ARIZ. REV. STAT. ANN. § 36-2802(D) (2010).

that he or she was not actually impaired.”¹⁶ Thus, impairment, not use, is the operative legal standard under Arizona’s Regulated Use regime.¹⁷ As states end their marijuana Prohibition Regimes, the impairment rule is becoming the law’s principal, if not its only tool for dealing with persons who drive after using marijuana.

III. LESSONS FROM ALCOHOL IMPAIRMENT

Impairment is not a new concept in the law. For generations, it been a central fact to be proven in criminal cases of alleged drunk driving and in civil cases assigning liability arising out of drunk driving. The American legal system has a long history of dealing with the admissibility and sufficiency of proofs of alcohol impairment. This rich body of experience can be profitably relied upon to inform our study of the legal and policy issues associated with marijuana impairment.

The beginning of widespread use of automobiles in the United States roughly coincided with the alcohol prohibition era, which began with the long campaigns that led to the adoption of the Eighteenth Amendment in 1919 and ended with its repeal by the Twenty-First Amendment in 1933. It is not surprising that “drunk driving” laws first appeared around this time. New Jersey enacted what is believed to be the United States’ first drunk driving law in 1906, which consisted of a single sentence: “No intoxicated person shall drive a motor vehicle.”¹⁸ New York followed suit in 1910 with a statute providing that “whoever operates a motor vehicle while in an intoxicated condition shall be guilty of a misdemeanor.”¹⁹ With the enactment of these laws America embarked on its long journey to set evidentiary rules by which the fact of impairment can be proven in court.

¹⁶ *Ishak v. McClennen*, 388 P.3d 1, 4 (Ariz. Ct. App. 2016); *Dobson v. McClennen*, 361 P.3d 374, 378 (Ariz. 2015).

¹⁷ Of course, a statutory or other authoritative definition of impairment under Arizona law (such as is the case in Illinois, New Jersey, and New York) would be immensely helpful in the context of both alcohol and marijuana impaired driving. However, there is a definition of impairment in the context of Arizona’s Employment Practices and Working Conditions law. Under that statute, an employee is impaired if drugs or alcohol “decrease or lessen the employee’s performance of the duties or tasks of the employee’s job position.” ARIZ. REV. STAT. ANN. § 23-493(7) (2011). By analogy, an Arizona medical marijuana user who invokes the Medical Marijuana Act’s protection against conviction under the impaired driving law may well argue that the marijuana had not “decreased or lessened the driver’s performance of the duties or tasks” of a driver, even in the slightest degree.

¹⁸ An Act Defining Motor Vehicles and Providing for the Registration of Same, 1906 N.J. Laws ch. 113, §19. This law was a prototype for the modern comprehensive regulation of the ownership and operation of automobiles. It included the registration of automobiles, licensing of drivers, statewide speed limits, and a variety of other provisions that are commonplace today.

¹⁹ Act of May 31, 1910, ch. 374, § 290(3), 1910 N.Y. Laws, 673, 684.

A. Reliance Upon Factual and Opinion Testimony as Proof of Alcohol Impairment

At the time of the early drunk driving laws, there was only one way to prove impairment: contemporaneous observation of the accused. Indeed, a conviction “could be based solely on the defendant’s conduct and demeanor at the time of arrest.”²⁰ The widespread and frequent occurrence of alcohol intoxication led courts to accept testimony of this sort from anyone. Neither special skill or training, nor specific observational methods was required. Courts have received factual testimony concerning things like an odor of alcohol, stumbling, or general lack of physical coordination. But witnesses in alcohol impairment cases have not been limited to factual testimony. The attributes of alcohol intoxication are so well-known and generally understood that courts early on ruled that any person is competent to testify as to their opinion that a driver was alcohol impaired, and this testimony can be sufficient to sustain a conviction.²¹

The rationale for admitting lay opinions on the ultimate question of alcohol impairment is that alcohol impairment is so much a part of the common experience of ordinary persons that lay opinions on the subject are “rationally based” and “helpful . . . to determining a fact in issue.”²² The New Jersey Supreme Court put it this way:

[Because] sobriety and intoxication are matters of common observation and knowledge, New Jersey has permitted the use of lay opinion testimony to establish alcohol intoxication. Founded on that premise, lay opinion consistently has been admitted to prove that a defendant was operating a motor vehicle while under the influence of intoxicating liquor It is not to be doubted that the average witness of ordinary intelligence, although lacking special skill, knowledge and experience but who has had the opportunity of observation, may testify whether a certain person was sober or intoxicated.²³

In Illinois, the same rule applies: “it is well established that the average adult is competent to testify regarding alcohol intoxication because it is within the common experience of most adults.”²⁴

Despite its admissibility under the rules of evidence, there are well-recognized problems with lay testimony concerning alcohol impairment, especially lay opinion testimony. Persons observe subjects in their own way,

²⁰ *People v. Cruz*, 48 N.Y.2d 419, 423 (1979).

²¹ New Jersey adopted such a rule as early as 1924. *Searles v. Pub. Serv. Ry. Co.*, 126 A. 465, 466 (N.J. 1924). *See also, Bealor*, 902 A.2d at 233.

²² *See, e.g.*, FED. R. EVID. 701; N.J. R. EVID. 701; ILL. R. EVID. 701.

²³ *Bealor*, 902 A.2d at 234.

²⁴ *People v. Foltz*, 934 N.E.2d 719, 723 (Ill. App. Ct. 2010).

each person deciding which behaviors are important to observe and how those behaviors should be evaluated. Persons observe through the lens of their own experience and abilities, making differences in age, gender, language, dialect and education potentially confounding factors, and causing each observer to assign different weights to and draw different conclusions from the same behaviors. The opinions drawn from these highly variable observations can be erroneous. These errors can be ordinary mistakes or the result of explicit or implicit bias.²⁵

Also, the vigor of enforcement efforts can vary with differences in perception of the seriousness of impaired driving. Consider *People v. Kiss*,²⁶ where the police beat a suspect in order to obtain the suspect's consent to a breath alcohol test, and the suspect consented to the test only out of fear of further beating.²⁷ The California Court of Appeals affirmed the admission of the result of the test, which indicated an impossible blood alcohol concentration of 22%,²⁸ because it believed that admitting evidence obtained this way did *not* rise to the level of making "a mockery and a pretense of a trial."²⁹ *Kiss's* admission of brutally obtained and completely incredible evidence is probably the high water mark of zeal by police and the courts in their efforts to protect the public from drunk drivers. On the other hand, one cannot help but be aware of instances in life and popular culture where public drunkenness is seen as a merely laughing matter and the "town drunk" is portrayed as a humorous, loveable character.³⁰ Either of these attitudes towards intoxication unavoidably colors the observer's perception of impairment *vel non*, making the observer's opinion less trustworthy. These unwise and unfounded attitudes can be prevalent to an unfortunate degree. Neither the variation in enforcement attributable to the influence of these attitudes, nor their distorting effect on witness perceptions and testimony is acceptable.

B. Dr. William Haddon and Science-Based Testing

The imprecision and unpredictability arising out of relying on testimony concerning lay observations and opinions in alcohol impairment

²⁵ A full treatment of bias in these cases is beyond the scope of this paper. For present purposes, it is enough to note that police officers – like all persons – can exhibit implicit and explicit bias. See, for example, Ngozi Caleb Kamalu, *African Americans and Racial Profiling by U.S. Law Enforcement*, 9 AFR. J. CRIMINOLOGY & JUSTICE STUDIES 187 (2016).

²⁶ *People v. Kiss*, 268 P.2d 924 (Cal. Dist. Ct. App. 1954).

²⁷ *Kiss*, 268 P.2d at 927.

²⁸ *Id.* A blood alcohol concentration of 22% would have been fatal. As is discussed below, intoxication occurs when blood alcohol concentration reaches 0.08%. A fine port wine typically has an alcohol concentration of less than 20%.

²⁹ *Kiss*, 268 P.2d at 927.

³⁰ *Otis Jump Rope*, YOUTUBE (July 7, 2009), <https://www.youtube.com/watch?v=r1C1PbY6EoU>; *Otis Sobriety Test*, YOUTUBE (June 2, 2007), https://youtu.be/sL9TunUh_bw.

cases was recognized early on. An objective indicator of alcohol impairment was eagerly sought. The pivotal figure in this effort was the physician and epidemiologist Dr. William Haddon.³¹

Dr. Haddon was a pioneer in the effort to find a science-based standard for alcohol impairment. Beginning in the late 1950's, Dr. Haddon worked to identify the relationship between alcohol and dangerous driving.³² Using reports of single-vehicle fatal crashes,³³ Dr. Haddon demonstrated that these fatal crashes were strongly correlated with a Blood Alcohol Concentration (BAC) of 0.08 – 0.10 percent.³⁴ Subsequent studies, some dealing with highway crashes and others dealing with laboratory simulations, confirmed Dr. Haddon's work.³⁵ As a result of the rigorous epidemiologic studies by Dr. Haddon and his colleagues, a BAC of 0.08% has come to be recognized as a valid, science-based proxy for alcohol impairment.

The identification of a valid, science-based proxy for alcohol impairment led to a universal redrafting of drunk driving laws to include a 0.08% BAC limit.³⁶ Statutes containing the general prohibition against driving while impaired were not repealed, but merely supplemented by the *per se* prohibition against driving with a BAC of 0.08%. This science-based proxy for alcohol impairment has greatly reduced, although probably not eliminated, bias and inconsistency in the enforcement of drunk driving laws. It makes it possible to perform a biochemical test that, if properly executed, gives an objective, verifiable result that can be compared to a bright line standard – a remarkable advance over reliance upon lay opinion testimony that “he looked drunk to me.”

IV. CURRENT PROOF OF MARIJUANA IMPAIRMENT

³¹ Dr. Haddon's work extended to many aspects of automobile safety, including safety belts, and air bags.

³² Dr. Haddon's many publications include: William Haddon Jr., *Alcohol in the Single Vehicle Fatal Accident: Experience of Westchester County*, NY J. AM. MED. ASS'N., 1587 (1959); James R. McCarroll & William Haddon Jr., *A Controlled Study of Fatal Automobile Accidents in New York City*, J. CHRONIC DISEASES 811 (1962); William Haddon Jr., *A Note Concerning Accident Theory and Research with Special Reference to Motor Vehicle Accidents* ANNALS N.Y. ACAD. SCI. 635 (1963).

³³ Single vehicle fatal crashes were chosen because, unlike parking lot fender-benders, they always involved an undoubted public health issue (i.e. death), and because data on these crashes were readily available.

³⁴ See, Andrea Roth, *The Uneasy Case for Marijuana as Chemical Based Jurisprudence of Dangerousness*, 103 CALIF. L. REV. 841, 846-70. Prof. Roth's scholarly account of Dr. Haddon's development of a science-based standard for alcohol impairment is required reading.

³⁵ *Id.*

³⁶ See, for example, CAL. VEHICLE CODE §23152(b); ILL. COMP. STAT § 11-501(a)(1); NEV. REV. STAT. §484C.110(1)(b); N.Y. VEHICLE & TRAFFIC LAW § 1192(2); and N.J. STAT. ANN. § 39:4-50(a).

When a state transitions from a Prohibition Regime to a Regulated Regime it must embark on the task that is the subject of this paper: finding a practical, legally admissible, and scientifically valid way to determine whether a person is impaired as result of marijuana use. To date, several approaches have been used. For the reasons discussed below, none are entirely satisfactory and some of them should be discontinued.

A. Factual Testimony Based On Lay Observation of the Subject

Witnesses are almost always allowed to give testimony describing things that they have observed – the weather, odors, stumbling, words spoken in their presence – and much of this testimony can be relevant to the issue of impairment. As a general matter, the admissibility of this kind of testimonial evidence is not seriously questioned. On the other hand, its weight and sufficiency has been hotly disputed.

Testimony concerning lay observation of impairment due to drugs (not just marijuana) is often treated differently than impairment due to alcohol. For example, in New Jersey, lay testimony concerning the facts of the subject’s behavior is admissible, and when coupled with proof that the subject had used drugs at the time is sufficient for the fact finder to conclude that the subject was impaired by marijuana.³⁷ In Illinois, the factual (i.e. non-opinion) testimony of an arresting officer, without more, can be sufficient to support a conviction for driving while impaired by marijuana.³⁸

B. Lay Opinion Testimony Based on Observation of the Subject

As noted in the above discussion of alcohol impairment, the opinion of a lay observer on the ultimate question of impairment due to alcohol is admissible and often sufficient to support a finding of impairment.³⁹ This is not always the case with marijuana impairment. In New Jersey marijuana impairment is not thought to be a “matter of common observation” such that a lay opinion on the subject would be rationally based and helpful to the trier of fact, as required by the rules of evidence. As the New Jersey Supreme Court wrote: “No such general awareness exists as yet with regard to the

³⁷ “[L]ay observations of the fact of intoxication, coupled with additional independent proofs tending to demonstrate defendant’s consumption of narcotic, hallucinogenic or habit-producing drugs as of the time of the defendant’s arrest, constitute proofs sufficient to allow the fact-finder to conclude, without more, that the defendant was intoxicated beyond a reasonable doubt and, thereby, to sustain a conviction” *Bealor*, 902 A.2d at 227-28. The required independent proof of recent consumption of marijuana can take the form of an admission of recent use volunteered by the subject to a police officer – an astonishingly common occurrence.

³⁸ *People v. Castino*, 2019 IL App (2d) 170298 ¶¶ 14-19, *citing* *People v. Janik*, 492 N.E.2d 582 (Ill. 1989).

³⁹ *See* cases cited *supra* notes 23-24.

signs and symptoms of the condition described as being ‘high’ on marihuana.”⁴⁰

C. Expert Opinion Testimony on the Question of Marijuana Impairment

As noted above, lay opinion testimony on the ultimate question of marijuana impairment is often not admissible. Even when a lay opinion is admitted, it can be easily discounted by the lay witness’s peers on the jury. This has sometimes proven to be an insurmountable problem. Proponents of opinion testimony on the ultimate question of marijuana impairment have thus turned to the tactic of characterizing the proffered opinions as those of an expert.

Characterizing proffered testimony as an expert opinion offers more than just admissibility. The witness is clothed in the status of an expert, a person who has mastered a discipline to such an extent that the witness and their testimony are given special status in the courtroom. Factfinders themselves lack this status and often defer to those who have it. Lay judges and jurors are often hesitant to disagree with an expert in a field, and this understandable deference can result in attaching undue, even dispositive, weight to the expert’s testimony. Courts have recognized that when a witness’ testimony is presented to the jury as that of an expert, the jury can be “led to believe that the evidence is entitled to greater weight than it deserves.”⁴¹ In *Daubert*, the U.S. Supreme Court recognized the great and sometimes excessive persuasiveness of alleged expert testimony: “Expert evidence can be both powerful and quite misleading because of the difficulty in evaluating it. Because of this risk, the judge in weighing possible prejudice against probative force under Rule 403 of the present rules exercises more control over experts than over lay witnesses.”⁴² The New Jersey Supreme Court has noted the “compelling voice” that is conferred by expert status and warned that jurors may “accord excessive weight” to an expert’s testimony “precisely because the evidence is labeled ‘scientific’ and ‘expert.’”⁴³ The Minnesota Supreme Court has noted that expert witnesses have the ability to “unduly influence the jury” and requires that “expert testimony be carefully monitored in criminal cases so that the jury is not dissuaded from exercising its own independent judgement.”⁴⁴ Courts of other states have also

⁴⁰ *Bealor*, 902 A.2d at 227.

⁴¹ *State v. Klawiter*, 518 N.W.2d 577, 585 (Minn. 1994).

⁴² *Daubert*, 509 U.S. at 595, quoting Jack B. Weinstein., *Rule 702 of the Federal Rules of Evidence is Sound; It Should Not Be Amended*, 138 F.R.D. 631, 632 (1991).

⁴³ *In re Accutane Litigation*, 191 A.3d 560, 589 (N.J. 2018).

⁴⁴ *State v. DeShay*, 669 N.W.2d 878, 885 (Minn. 2003).

recognized this distortion of perception that occurs when a witness is anointed an expert and granted an expert's exceptional testimonial latitude.⁴⁵

Judges are not alone in recognizing this effect of designating a person as an expert. Neurobiologists at Emory University have used Functional MRI to observe the activity of decision-making portions of the brain when a person is given advice from a supposed expert. They found that the relevant decision-making and evaluation centers of the person's brain were not engaged to evaluate the advice they were given when the person was told that the advice came from an expert.⁴⁶ In short, people "offload" or subcontract their rational evaluation processes to the expert – they tend to accept the expert uncritically.⁴⁷

Even purported experts are themselves misled by their own claims of expert status. Atir *et al.* reported a series of four studies that they conducted involving the tendency of experts to "overclaim," a phenomenon by which persons "claim[] knowledge of concepts, events, and people that do not exist and cannot be known."⁴⁸ Atir *et al.* showed that persons who saw themselves as having expertise in an area were more likely to overclaim, and concluded that "Self-perceived experts may give bad counsel when they should give none."⁴⁹ This is not a matter of an intent by the purported expert to deceive others, but rather a matter of self-deception by the purported expert. The literature has extensively explored and described this phenomenon.⁵⁰ The tendency for overclaiming not only explains the willingness of experts to offer unjustified opinions, it also accounts for the apparent conviction with which those unjustified opinions are offered.

⁴⁵ For example, *State v. Corbett*, 839 S.E.2d 361, 399 (N.C. 2020); *Clark v. State*, 2019 WL 5566234 (Miss. Ct. App. 2019); *State v. Kony*, 375 P.3d 1239, 1249-1250 (Hawaii 2016); *State v. McGrady*, 787 S.E.2d 1, 10 (N.C. 2016); *State v. Casillas*, 782 N.W.2d 882, 896 (Neb. 2010); *Burton v. Commonwealth*, 300 S.W.3d 126, 141 (Ky. 2009).

⁴⁶ Jan B. Engelman et al., *Expert Financial Advice Neurobiologically 'Offloads' Financial Decision-Making Under Risk* PLOS ONE, Mar. 4, 2009, doi:10.1371/journal.pone.0004957.

⁴⁷ *Id.*

⁴⁸ Stav Atir, Emily Rosenzweig, & David Dunning, *When Knowledge Knows No Bounds: Self-Perceived Expertise Predicts Claims of Impossible Knowledge*, ASS'N PSYCH. SCI. 1295 (2015), doi:10.1177/0956797615588195. Dr. Dunning, one of the co-authors of this article, originally described the eponymous "Dunning-Kruger Effect." *Dunning-Kruger Effect*. EN.WIKIPEDIA.ORG, https://en.wikipedia.org/wiki/Dunning%E2%80%93Kruger_effect (Accessed June 1, 2020).

⁴⁹ *Id.*

⁵⁰ See, for example, Patrick D. Dunlop et al., *Openness to (Reporting) Experiences That One Never Had: Overclaiming as an Outcome of the Knowledge Accumulated Through a Proclivity for Cognitive and Aesthetic Exploration*, 113 J. PERS. SOC. PSYCH. 810 (2017), doi: 10.1037/pspp0000110; Carey K. Morewedge et al., *The (Perceived) Meaning of Spontaneous Thoughts*, 143 J. EXPERIMENTAL PSYCH. GEN. 1742 (2014), doi: 10.1037/a0036775; Rebecca J. Schlegel et al., *The Dynamic Interplay Between Perceived True Self-Knowledge and Decision Satisfaction*, 104 J. PERS. SOC. PSYCH. 542 (2013), doi: 10.1037/a0031183; Danu Anthony Stinson et al., *In Search of Clarity: Self-Esteem and Domains of Confidence and Confusion*, 34 PERS. SOC. PSYCH. BULL. 1541 (2008), doi: 10.1177/0146167208323102.

A full discussion of overclaiming by purported experts, and the tendency of factfinders, especially jurors, to overvalue and to defer to testimony from supposed experts is beyond the scope of this paper. It is enough to note that law and science have long recognized these effects and the dangers that they present.

The admissibility of expert opinion testimony is governed by each jurisdiction's rules of evidence. The Federal Rules of Evidence apply when expert opinion testimony is offered in federal court.⁵¹ State rules of evidence apply in state courts, but these are generally similar to the highly influential Federal Rules of Evidence and, with respect to expert opinion testimony, are often interpreted in light of *Daubert*,⁵² and *Kumho*,⁵³ two federal decisions interpreting the federal rules governing expert opinion testimony. For convenience, this article will discuss the admissibility of expert opinion testimony by general reference to Federal Rule 702,⁵⁴ as well as with reference to some alternate, state-specific approaches.

D. The Drug Recognition Expert

In recent years a new figure has come on the scene: a police officer who purports to have mastered a special technique that enables the officer to accurately identify drug-impaired drivers. Known as a Drug Recognition Expert (DRE) police officer, this purported expert has become a fixture in some courtrooms across the country, and is transforming how persons are prosecuted for marijuana impairment. In states where marijuana is legalized, DRE police officers are touted as key figures in dealing with marijuana impaired drivers.⁵⁵ DRE police officers offer testimony of various types, including factual testimony concerning things that they have personally observed. However, it is their opinion testimony that is of greatest interest and concern.

⁵¹ For example, when a driver is accused of driving while impaired in a National Park, a National Forest an Army fort, or other place under federal jurisdiction.

⁵² *Daubert v. Merrell Dow Pharma.*, 509 U.S. 579 (1983).

⁵³ *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999).

⁵⁴ Rule 702. Testimony by Expert Witnesses

A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if:

(a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;

(b) the testimony is based on sufficient facts or data;

(c) the testimony is the product of reliable principles and methods; and

(d) the expert has reliably applied the principles and methods to the facts of the case.

⁵⁵ For example, Megan Jones, *Drug Recognition Experts Will Play A Big Role in Detecting Drivers Who Are High Come Jan. 1, Police Say*, CHICAGO TRIB. (Dec. 27, 2019), <https://www.chicagotribune.com/suburbs/aurora-beacon-news/ct-abn-aurora-drug-recognition-experts-st-1229-20191227-lq34jrzs6nh6hhlm5nyd7hdm-story.html>.

DRE police officers originated with the Los Angeles Police Department, and have evolved into an *ad hoc* national program administered by the International Association of Chiefs of Police (IACP) in cooperation with the National Highway Traffic Safety Administration (NHTSA).⁵⁶ In North America, DRE police officers are certified or accredited by agencies (typically police departments) in each state or province⁵⁷ which administer an approved course that must be completed by the DRE police officer. This course purports to train the DRE police officer to administer a standard series of tests and to observe, interpret, and report the results in a standard way.⁵⁸

Police officers who complete the DRE course call themselves “Drug Recognition Experts.” They make much of this self-conferred title and status. DRE police officers sometimes wear a special badge or a ribbon on their uniform to identify themselves as experts,⁵⁹ and their paperwork is festooned with official looking DRE police officer seals or insignia.⁶⁰ DRE police officers have formed trade associations with websites that are similarly decorated with seals and insignia, along with claims to “professional association” status.⁶¹

The legal question that must be asked is whether this is sufficient to establish the admissibility of the opinion testimony of the DRE police officer. Jurisdictions diverge widely on this point. In some states, DRE police officer testimony is authorized by legislative action.⁶² Other states admit DRE police officer testimony under the rules of evidence governing the admission of expert opinion testimony, which will be discussed in detail below. Case law

⁵⁶ *The IACP Drug Recognition Section*, THEIACP.ORG, <https://www.theiacp.org/working-group/section/drug-recognition-expert-section-dre> (Accessed April 26, 2020).

⁵⁷ For example, the California Highway Patrol performs this function in California. *Drug Recognition Evaluator Program*, CHP.CA.GOV, <https://www.chp.ca.gov/programs-services/for-law-enforcement/drug-recognition-evaluator-program> (Accessed April 28, 2020). The New Jersey State Police perform it in New Jersey. njsp.org. 2020. *Alcohol Drug Testing Unit | New Jersey State Police*, NJSP.ORG. [online] Available at: <https://www.njsp.org/division/investigations/alcohol-drug-testing.shtml> (Accessed April 28, 2020). Similar procedures are followed in Canada, *Drug Recognition Expert Evaluations*, ROYAL CANADIAN MOUNTED POLICE, <https://www.rcmp-grc.gc.ca/ts-sr/dree-eert-eng.htm> (last visited Sep 4, 2020); *R. v. Joyce*, 2017 NSPC 81 at ¶ 43; *R. v. Bingley* [2017] 1 SCR 170.

⁵⁸ *Id.*

⁵⁹ *Drug Recognition Expert (DRE) Certification Commendation Bar*, TANDTUNIFORMS.COM, https://tandtuniforms.com/shop/catalog/index.php?route=product/product&product_id=1986 (Accessed April 25, 2020).

⁶⁰ For example, *DRE Training Course Application*, CHP.CA.GOV., <https://www.chp.ca.gov/ImpairedDrivingSite/Documents/Training%20Request%20066%20Rev%202-18.pdf> (Accessed April 26, 2020); *Ill. DRE Training Application*, NEMRT.COM, https://www.nemrt.com/Downloads/DRE_Application.pdf (Accessed April 26, 2020); *NJ State Police Log Of Drug Influence Evaluations*, NJSP.ORG, https://www.njsp.org/division/investigations/pdf/adt/DRE_Rolling_Log_NJ_Example_2020.pdf (Accessed April 26, 2020); *Drug Recognition Expert*, ROYAL CANADIAN MOUNTED POLICE, <https://www.rcmp-grc.gc.ca/ts-sr/dre-ert-eng.htm> (Accessed Sep 4, 2020).

⁶¹ For example, *About Us* NJDRE.ORG., <http://www.njdre.org/about-us/> (Accessed April 26, 2020).

⁶² N.C. GEN. STAT. §8C-1; N.C. R. EVID 702(a)(1).

in at least two states interpret the Rules of Evidence to exclude DRE police officer opinion testimony.⁶³ The admissibility of DRE police officer opinion testimony is now before the New Jersey Supreme Court.⁶⁴

For the reasons given below, at least in the context of marijuana impairment, the correct answer to the admissibility question is that, while the DRE police officer's factual observations may be admitted as such, the DRE police officer's opinion testimony (lay or expert) on the ultimate question of marijuana impairment should not be admitted.

1. The DRE Protocol and How It Is Used

The centerpiece of the DRE police officer's work is a 12-step "protocol":

1. Breath Alcohol Test. (To eliminate possible alcohol intoxication.)
2. Interview of the Arresting Officer
3. Preliminary Examination and 1st Pulse (Observe the subject's attitude, coordination, speech, breath and face.)
4. Eye Examination (Horizontal & vertical gaze nystagmus; HGN & VGN)
5. Divided Attention Psychophysical Tests (e.g. Walk and Turn, One Leg Stand, and Finger to Nose tests)
6. Vital Signs (Blood Pressure & Temp) and 2nd Pulse
7. Dark Room Examinations
8. Examination of Muscle Tone
9. Check for Injection Sites and 3rd Pulse
10. Subject's Statements and Other Observations (after Mirandizing)
11. Analysis and Opinions (DRE determines whether subject is impaired)
12. Toxicological Examination (confirmatory of DRE opinion)⁶⁵

The DRE police officer carries out these 12 steps, and then interprets their results using an interpretation matrix or chart. A copy of the DRE interpretation matrix is reproduced below as Figure 1.

a. The DRE Police Officer's Medical Evaluations

Most of the steps of the DRE 12-step protocol call for medical examinations to be made by a person with no medical training (i.e. the police officer). A DRE police officer is not required to be a doctor, nurse, paramedic

⁶³ State v. Brightful, No. K-10-40259 (Md. Cir. Ct. 2012); State v. Howard, No. K1-2017-0564A, 2020 WL 880339 (R.I. Supr. Ct. Feb.).

⁶⁴ State v. Olenowski, Supreme Court of New Jersey, Docket No. 082253.

⁶⁵ *12 Step Process*, THEIACP.ORG. <https://www.theiacp.org/12-step-process> (Accessed April 10, 2020)].

or EMT.⁶⁶ They are simply police officers – a valuable calling to be sure, but not health care professionals in any sense. Even so, the DRE 12-step protocol requires the DRE police officer to test for hypertension/hypotension, pulse rate (three times!), muscle tone, and certain neuromotor functions.

The medical evaluations performed by the DRE police officer under the DRE protocol are administered in a manner that appear to be designed to distort the results of those tests. When these medical evaluations are made by medical professionals, the very act of measurement is known to distort the measurement. For example, physicians are well acquainted with “white coat hypertension,” the phenomenon where a patient’s blood pressure jumps simply because it is being measured by a physician (who typically wears a clinician’s white coat).⁶⁷ Medical professionals are trained to identify and account for this distortion.⁶⁸ The DRE protocol calls for measurement of hypertension/hypotension and pulse rate in the charged environments of the roadside arrest location or in a police station, a setting which by itself has been recognized as more than sufficient to account for elevated pulse and blood pressure.⁶⁹ But the DRE protocol makes no allowance for this well recognized effect on their observations. Taking the subject’s pulse during three of the 12 steps would seem to serve no purpose other than to alarm the subject and distort the observations of pulse rate, especially when the DRE police officer chooses to measure the subject’s carotid pulse by placing the police officer’s fingers on the subject’s throat and neck in accordance with DRE training.⁷⁰ Of course, the possibility exists that DRE police officers are so inept at observing pulse rates that they must do it three times to be sure of getting it right.⁷¹ One may speculate as to the reasons why the 12-step protocol used by DRE police officers ignores, and even encourages, these “badge-and-gun” induced distortions, but their existence cannot be seriously doubted.

⁶⁶ NHTSA, Transp. Safety Institute, & IACP, *Participant Manual – Drug Recognition Expert Course*, Feb. 2018, at 128, https://www.njsp.org/division/investigations/pdf/adu/2018_DRE_7-Day_Full_Participant_Manual.pdf (hereafter DRE Training Materials). This is a 981 page document, with areas for notetaking, and an interrupted page numbering system. In this paper, citations to pages within this document are based on the page’s position in the overall document. Thus, a citation to “page 128” is to page 128 of 981; *see also*, *State v. Brightful*, No. K-10-40259 (Md. Cir. Ct. 2012).

⁶⁷ Thomas G. Pickering et al., *Recommendations for Blood Pressure Measurement in Humans and Experimental Animals*, 111 *HYPERTENSION* 142 (2005); Sheldon G. Shepps, *When Blood Pressure Rises at The Doctor's Office* MAYO CLINIC, <https://www.mayoclinic.org/diseases-conditions/high-blood-pressure/expert-answers/white-coat-hypertension/faq-20057792> (Accessed April 19, 2020).

⁶⁸ Briana Cobos et al., *White Coat Hypertension: Improving the Patient-Health Care Practitioner Relationship*, 8 *PSYCH. RSCH. AND BEHAV. MGMT.* 133 (2015).

⁶⁹ *Burton v. Commonwealth*, 300 S.W.3d 126, 140-141 (Ky. 2009).

⁷⁰ DRE Training Materials, *supra*, note 66, at p. 245.

⁷¹ If that is indeed the case, it inspires no confidence in the DRE police officer.

Another example of the medical evaluations performed by the DRE police officer is the “Examination of Muscle Tone.” The DRE protocol purports to use this physiological factor to diagnose drug use and the type of drug used.⁷² Because muscle tone is a recognized concept in physiology, its use adds to the DRE Protocol’s appearance of scientific validity. Closer examination reveals otherwise.

The DRE Training Materials arm the prospective DRE police officer with the following instructions on how to make an examination of muscle tone: “Starting with the subject’s left arm, examine the arm muscles. Firmly grasp the upper arm and slowly move down to determine muscle tone. The muscles should appear flaccid, normal, or rigid to the touch. Examine the right arm in the same fashion.”⁷³ The DRE Training Materials offer no guidance as to what degree of tone is “normal,” leaving this to the DRE police officer’s personal belief concerning how muscles should feel. It is unlikely that any physician or other health care professional would ever evaluate or report a patient’s muscle tone this way. Muscle tone is evaluated by observing a limb’s range of and passive resistance to motion, not by how muscles “appear . . . to the touch,” and muscle tone is reported on one of several recognized numerical scales, such as the Modified Ashworth Scale, the Tardieu Scale, or the Tonal Assessment Scale, not as “flaccid, normal, or rigid.”⁷⁴ The muscle tone observation and reporting technique in which DRE police officers are trained is a mere simulacrum of a science-based technique. No matter how sincerely it is practiced, it is unlikely to have any scientific or medical validity. This is the predictable result of having a medical evaluation designed and performed by persons who are not medical professionals.

b. Forming an Opinion On Impairment Based On the DRE Police Officer’s Medical Evaluations

After completing these 12 steps, the DRE police officer interprets the results using the DRE interpretation matrix shown here as Figure 1, and the DRE police officer then forms a purportedly expert opinion as to whether the subject is impaired and the source of the impairment. The DRE interpretation matrix is reproduced as Figure 1.

⁷² See, Fig. 1.

⁷³ DRE Training Materials, *supra*, note 66, at p. 128.

⁷⁴ A. B. Ward, *Assessment of Muscle Tone* 29 AGE AND AGING 385 (2000); Chris McGibbon et al., *Evaluation of a Toolkit for Standardizing Clinical Measures of Muscle Tone*, PHYSIOLOGY MEASUREMENT, Aug. 2018; J.M. Gregson et al., *Reliability of the Tonal Assessment Scale and the Modified Ashworth Scale as Clinical Tools for Assessing Poststroke Spasticity*, 80 ARCHIVES PHYSICAL MED. REHAB. 1013 (1999).

Major Indicators	CNS Depressant	CNS Stimulant	Hallucinogen	Dissociative Anesthetic	Narcotic Analgesic	Inhalant	Cannabis
HGN	PRESENT	NONE	NONE	PRESENT	NONE	PRESENT	NONE
VGN	PRESENT * High Dose	NONE	NONE	PRESENT	NONE	PRESENT * High Dose	NONE
Lack Of Convergence	PRESENT	NONE	NONE	PRESENT	NONE	PRESENT	PRESENT
Pupil Size	NORMAL (1)	DILATED	DILATED	NORMAL	CONSTRICTED	NORMAL (4)	DILATED (6)
Reaction to Light	SLOW	SLOW	NORMAL (3)	NORMAL	LITTLE OR NONE	SLOW	NORMAL
Pulse Rate	DOWN (2)	UP	UP	UP	DOWN	UP	UP
Blood Pressure	DOWN	UP	UP	UP	DOWN	UP/DOWN (5)	UP
Body Temperature	NORMAL	UP	UP	UP (PCP)	DOWN	UP/DOWN/ NORMAL	NORMAL
Muscle Tone	FLACCID	RIGID	RIGID	RIGID	FLACCID	FLACCID	NORMAL
General Indicators	UNCOORDINATED DISORIENTED SLUGGISH THICK SLURRED SPEECH DRUNK-LIKE BEHAVIOR DROWZINESS DROOPY EYES FUMBLING GAIT ATAXIA	RESTLESSNESS BODY TREMORS EYELID TREMORS EXCITED EUPHORIC TALKATIVE EXAGGERATED REFLEXES ANXIETY GRINDING TEETH (BRUXISM) REDNESS TO NASAL AREA RUNNY NOSE LOSS OF APPETITE INSOMNIA INCREASED ALERTNESS DRY MOUTH IRRITABILITY	DAZED APPEARANCE BODY TREMORS SYNTHESIA HALLUCINATIONS PARANOID UNCOORDINATED NAUSEA DISORIENTED PERSPIRING POOR PERCEPTION OF TIME & DISTANCE MEMORY LOSS DISORIENTATION FLASHBACKS FLORECTION MAY BE OBSERVED (GOOSE BUMPS, HAIR STANDING ON END)	PERSPIRING WARM TO TOUCH BLANK STARE VERY EARLY ANGLE OF ONSET INCOHERENT INCOMPLETE VERBAL RESPONSES REPETITIVE SPEECH INCREASED PAIN THRESHOLD CONFUSED AGITATED HALLUCINATIONS POSSIBLY VIOLENT & COMBATIVE CHEMICAL ODOR *MOON WALKING*	DROOPY EYES(POSS) ON THE NOD DROWZINESS DEPRESSED REFLEXES LOW, RASPY, SLOW SPEECH DRY MOUTH FACIAL ITCHING EUPHORIA FRESH PUNCTURE MARKS NAUSEA CONTROL FLUSHED FACE INCOHERENT INTENSE HEADACHES	RESIDUE OF SUBSTANCE AROUND NOSE & MOUTH ODOR OF MARIJUANA SUBSTANCE NAUSEA SLURRED SPEECH CONFUSION BLOODSHOT, WATERY EYES LACK OF MUSCLE CONTROL PUPILS PULSATE IN SIZE, GROWING LARGER ON EXPANSION PULSATIONS)	MARKED REDDENING OF CONJUNCTIVA ODOR OF MARIJUANA MARIJUANA DEBRIS IN MOUTH BODY TREMORS EYELID TREMORS RELAXED INHIBITIONS INCREASED APPETITE IMPAIRED PERCEPTION OF TIME & DISTANCE DISORIENTATED POSSIBLE PARANOID BEEBOUND- PUPILS PULSATE IN SIZE, GROWING LARGER ON EXPANSION PULSATIONS)
Updated 12/15							
Duration of Effects	BARBITURATES: 1-16 HOURS TRANQUILIZERS: 4-8 HOURS	COCAINE: 5-90 MINUTES AMPHETAMINES: 4-8 HOURS METHAMPHETAMINE 12 HOURS	DURATIONS VARIES WIDELY FROM ONE HALLUCINOGEN TO ANOTHER	ONSET: 1-5 MINUTES PEAK EFFECTS: 15-30 MINUTES EXHIBITS EFFECTS UP TO 4-6 HOURS	HEROIN: 4-6 HOURS METHADONE UP TO 24 HOURS OTHERS: VARY	4-8 HOURS FOR MOST VOLATILE SOLVENTS ANESTHETIC GASES AND AEROSOLS VERY SHORT DURATION	2-3 HOURS EXHIBITS EFFECTS 3-6 HOURS FEEL NORMAL
FOOTNOTES:				AVERAGE RANGES:			
1. SOMA, QUAAALIDES AND SOME ANTI-DEPRESSANTS USUALLY DILATE PUPILS				PULSE: 60-90 BPM			
2. QUAAALIDES, ETOH, AND POSSIBLY SOME ANTI-DEPRESSANTS MAY ELEVATE				PUPIL SIZES:			
3. CERTAIN PSYCHEDELIC AMPHETAMINES MAY CAUSE SLOWING				ROOM LIGHT: 2.5 - 5.0			
4. NORMAL BUT MAY BE DILATED				NEAR TOTAL DARKNESS: 5.0 - 8.5			
5. DOWN WITH ANESTHETIC GASES, UP WITH VOLATILE SOLVENTS AND AEROSOLS				DIRECT LIGHT: 2.0 - 4.5			
6. PUPIL SIZE POSSIBLY NORMAL				BLOOD PRESSURE: 120 - 140 / 70 - 90			
				BODY TEMP: 98.6 +/- 1 degree			

Figure 1. THE DRE INTERPRETATION MATRIX

An examination of the DRE interpretation matrix illuminates the shortcomings of the DRE protocol as a method for identifying marijuana impaired drivers. The matrix lists (1) physiological parameters that are evaluated by the DRE police officer during the officer's medical evaluation of the subject,⁷⁵ and (2) "general indicators" that the DRE police officer is expected to observe.⁷⁶

The physiological parameters in the DRE interpretation matrix provide almost no basis for determining whether the subject has used marijuana.⁷⁷ According to the DRE interpretation matrix, a marijuana impaired person has a normal temperature, normal HGN & VGN, and normal pupil size,⁷⁸ making

⁷⁵ See, *supra* notes 66-74 and associated text, and Fig. 1.

⁷⁶ See, Fig. 1.

⁷⁷ As explained in detail below, the DRE protocol purports to identify use of marijuana, not impairment by marijuana, even though DRE police officers claim to be able to use the protocol to identify persons who are impaired by marijuana.

⁷⁸ In the body of the matrix it identifies dilated pupils as an indicator of marijuana use, but in its footnote 6 it notes that a cannabis user's pupils might well be normal.

those parameters useless as indicators of marijuana impairment. The matrix identifies elevated blood pressure as an indicator of cannabis use, but approximately half of all adult Americans have hypertension,⁷⁹ making this parameter useless as an indicator of marijuana impairment. On top of that, as was pointed out above, the manner in which the DRE police officer measures blood pressure and pulse are calculated to result in elevated blood pressure and pulse rate.⁸⁰ And yet, these factors are part of the DRE interpretation matrix.

According to the DRE interpretation matrix, the only other physiological indicator of marijuana use that will be revealed by the DRE police officer's medical evaluation is "Lack of Convergence," which the DRE Training Materials define as "The inability of a person's eyes to converge , or "cross" as the person attempts to focus on a stimulus as it is pushed slowly toward the bridge of his or her nose."⁸¹ Not even the most ardent advocates of the use of the DRE Protocol claim that this physiological factor is sufficient to support a determination of impairment.

"Divided Attention" tests are among the steps of the DRE 12-step protocol. These test *skills* at least as much as *impairment*. As discussed below in connection with the Bigelow study, even proponents of the DRE protocol acknowledge that these are tests for skills that unimpaired individuals possess to significantly varying degrees, and that persons can be trained to improve their performance on these tests – all independent of any impairment.⁸² Also, performance on these tests can be affected by physical conditions that have no bearing on the question of impairment (e.g. a knee or ankle condition can affect a person's ability to perform the "one leg stand"). Thus, these tests are not reliable indicators of impairment. And yet they are part of the DRE interpretation matrix.

The General Indicators of marijuana use relied upon by the DRE interpretation matrix range from the merely amusing to the deeply troubling.

One of these diagnostic indicators is having the munchies ("increased appetite"). The DRE Training Materials actually use a color photograph of a young man stuffing a prodigious mass of junk food into his mouth to illustrate this supposedly important identification tool.⁸³ Whatever the validity of the stereotype of munchies as an indicator of marijuana use, it is almost impossible to envision a circumstance where a DRE police officer will (1) give a subject at the roadside access to a large quantity of food, and (2) allow

⁷⁹ *Facts About Hypertension*, CTR. FOR DISEASE CONTROL AND PREVENTION, <https://www.cdc.gov/bloodpressure/facts.htm> (Accessed May 10, 2020); *More Than 100 Million Americans Have High Blood Pressure, AHA Says*, AM. HEART ASS'N., <https://www.heart.org/en/news/2018/05/01/more-than-100-million-americans-have-high-blood-pressure-aha-says>, (Accessed May 10, 2020).

⁸⁰ See *supra* notes 67-70 and associated text.

⁸¹ DRE Training Materials, *supra* note 66, at p. 36.

⁸² See *infra* note 110 and associated text.

⁸³ DRE Training Materials, *supra* note 66, at p. 721.

the subject eat a lot of this food, so as to reveal to the DRE police officer the “increased appetite” that proves their impairment. And yet this factor is part of the DRE Interpretation Matrix.

Another indicator of marijuana impairment that the DRE interpretation matrix relies upon is a diagnosis of “possible paranoia.” The DRE Training materials don’t give the DRE police officer so much as a definition of paranoia, let alone any advice as to how to diagnose a person as possibly paranoid. The author has searched the literature and found no references to any reported technique that may be used to reliably make this psychiatric diagnosis during a roadside examination or an interview in a police station – especially while the DRE police officer is busy purporting to make other medical evaluations of the subject. It is clear that this basis for the DRE police officer’s expert opinion is founded on nothing more than the police officer’s personal view of what a paranoid person might do if stopped by a police officer. Further searches by the author have failed to discover any other context in which a police officer is allowed to render an expert opinion based on the police officer’s own roadside diagnosis of paranoia or any other psychiatric disorder. And yet this factor is part of the DRE Interpretation Matrix.

Other indicators of marijuana use that the DRE Interpretation Matrix relies upon are the presence of an odor of marijuana and the presence of marijuana “debris.” These can indicate only that at some past time marijuana may have been used (which, in a Regulated Use state, is perfectly legal), not that the subject is currently impaired by marijuana. This is a deficiency that runs through the DRE protocol: even if it were completely accurate, it is at most able to identify either the presence of or the use at some past time of marijuana, not that the subject is impaired. As the Illinois Court of Appeals noted in *Allen*, “[t]he statute does not criminalize having breath that smells like burnt cannabis.”⁸⁴ Indeed, in a Regulated Use state, not only it is perfectly legal to smell of burnt cannabis, the state is happy to have the benefit of tax revenues from people who burn cannabis.⁸⁵ And yet these factors are part of the DRE Interpretation Matrix.

2. The Purported Basis for the Admissibility of DRE Police Officer Testimony.

As can be seen from the above discussion of the 12-step DRE Protocol and its Interpretation Matrix, the procedure used by the DRE police officer is suspect on its face. It bears none of the attributes that would cause a person, in the conduct of their ordinary affairs, to rely upon it in matters of

⁸⁴ *People v. Allen*, 873 N.E.2d 30, 35 (Ill. App. Ct. 2007).

⁸⁵ *See infra* notes 201-203.

consequence. The result is no different when the Rules of Evidence are applied to determine whether it should be relied upon in the courtroom to establish criminal liability.

a. Admissibility of DRE Police Officer Expert Opinion Testimony Under Daubert and Its Progeny

One who proffers expert testimony bears the burden of establishing its admissibility.⁸⁶ To be admissible as an expert opinion, the opinion must, among other things, be shown to be based on “reliable principles and methods.”⁸⁷ The need for the proponent of expert opinion testimony to establish that it is based on reliable principles and methods cannot seriously be disputed. This is explicitly set forth in Rule 702 as one of four conditions that must be satisfied before expert opinion testimony can be offered. In *Daubert*, the Supreme Court acknowledged this requirement of Rule 702. The Supreme Court noted that Rule 702 “is premised on the assumption that the expert’s opinion will have a reliable basis in the knowledge and experience of his discipline.”⁸⁸ If the plain text of the rule were not enough, the courts have made it clear that a showing of a basis in reliable principles and methods is indispensable to admissibility of all expert opinion testimony. For example, in *Kumho*, the opinion testimony of a purported expert in “tire failure analysis” was not admitted because it had not been shown to be the product of reliable principles and methods.⁸⁹ The *Kumho* court noted that, because expert witnesses are given “testimonial latitude unavailable to other witnesses,” such as rendering opinions and relying on hearsay, courts have a “gatekeeping obligation” and must require that “the expert’s opinion will have a reliable basis in the knowledge and experience of his discipline.”⁹⁰ Thus, we must ask the following question: Is the DRE police officer’s purported expert opinion concerning impairment the product of reliable principles and methods?

Proponents of DRE police officer opinion testimony rely on three studies as proof that this testimony is based on principles and methods that, in actual practice, reliably identify marijuana impaired drivers and that

⁸⁶ For example, *People v. McKown*, 924 N.E.2d 941, 950 (Ill. 2010); *United States v. Tetiukhine*, 725 F.3d 1, 6 (1st Cir. 2013); *In re Pfizer Inc. Securities Litig.*, 819 F.3d 642, 658 (2d Cir. 2016); *Sims v. Kia Motors of Am., Inc.*, 839 F.3d 393, 400 (5th Cir. 2016); *E.E.O.C. v. Kaplan Higher Educ. Corp.*, 748 F.3d 749, 752 (6th Cir. 2014); *Menz v. New Holland North Amer., Inc.*, 507 F.3d 1107, 1114 (8th Cir. 2007); *United States v. 87.98 Acres of Land More or Less in the City of Merced*, 530 F.3d 899, 904 (9th Cir. 2008); *Conroy v. Vilsack*, 707 F.3d 1163, 1168 (10th Cir. 2013); *United States v. McGill*, 815 F.3d 846, 903 (D.C. Cir. 2016).

⁸⁷ For example, FED. R. EVID. 702(c); N.J. R. EVID. 702(c); ILL. R. EVID. 702(c).

⁸⁸ *Daubert*, 509 U.S. at 592.

⁸⁹ *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999).

⁹⁰ *Kumho*, 526 U.S. at 148, quoting *Daubert*, 509 U.S. at 592.

therefore establish the admissibility of the DRE police officer's expert opinion testimony.⁹¹ These are the Adler study,⁹² the Bigelow study,⁹³ and the Compton study.⁹⁴ All three of these three studies were funded, designed, and carried out for the purpose of establishing the admissibility of the DRE protocol.⁹⁵

None of these three studies have been published in a scientific or medical journal, and none have been subjected to peer review by the scientific or medical communities. On one hand, publication and peer review is not absolutely required. On the other hand, the consistent sheltering the DRE protocol from peer review invites the inference that the proponents of DRE police officer opinion testimony do not believe that the DRE protocol would survive peer review.

Adler illustrates several important shortcomings of these three attempts to show that the DRE protocol is based on reliable principles and methods for the identification of marijuana impaired drivers. Adler (and the other studies) sought only to identify drug *use*, not *impairment*. They begin from the premise that (1) a DRE police officer's job is to identify illegal drug use, and (2) a DRE police officer's identification of drug used is considered accurate, *even if the DRE police officer mis-identifies the drug*. Adler (and the other studies) ignore these misidentifications because the mere use of any and all drugs (e.g. marijuana, PCP, and crack cocaine) are illegal, so the errors in identifying the specific drug used make no difference.

For example, Adler counts as accurate a DRE police officer's opinion that a subject has used amphetamines when the subject was actually using marijuana.⁹⁶ This accounts for Adler's claim that DRE police officers were accurate over 83% of the time.⁹⁷ In truth, Adler's DRE police officers' attempts to identify what drug the subject may have used was correct only about 43 % of the time,⁹⁸ practically a guess. It is amazing that Adler's DRE police officers managed to so often mis-identify the drug that the subject had used. The Adler study reports that the vast majority of its subjects not only admitted to the arresting officer that they had used a drug, they also admitted

91 DRE Training Materials, *supra* note 66, at p. 72 & 82

92 Eugene V. Adler & Marcelline Burns, Drug Recognition Expert (DRE) Validation Study, Off. Highway Safety (1994) http://www.decp.us/pdfs/Adler_1994_DRE_validation_study.pdf.

93 George E. Bigelow, et al., Identifying Types of Drug Intoxication: Laboratory Evaluation of A Subject-Examination Procedure, Nat'l Inst. Drug Abuse (1985) <https://rosap.ntl.bts.gov/view/dot/1421>.

94 Richard P. Compton, Field Evaluation of the Los Angeles Police Dept. Drug Detection Program, U.S. Dept. Transp. (1986) http://decp.us/pdfs/Compton_1984_DRE_validation_study.pdf.

95 See, Bigelow, *supra* note 93, at p.1; Compton, *supra* note 94, at p.ii; Adler, *supra* note 92, at p.5, noting that this study was intended to "provide a source of scientifically valid data for the purpose of responding to legal challenges" to the DRE protocol.

96 Adler, *supra* note 92, at pp. 33-34.

97 *Id.*

98 *Id.*

the type of drug that they used!⁹⁹ But the Adler study glosses over these astonishing errors. Those who hold the Adler study out as proof of the accuracy of the DRE protocol rarely mention it at all. Only the almost fictitious 83% accuracy figure is mentioned.¹⁰⁰

This mischaracterization by Adler (and the other studies) of their data is crucially significant in states where marijuana use has been legalized. In a Regulated Use state, only if the driver is *impaired* by the *legally used* marijuana does the driver run afoul of the law. The Adler study did not investigate whether the DRE police officers could determine whether the subjects who used marijuana were actually impaired. The Adler study does nothing to establish that the DRE protocol is based on reliable principles and methods for identifying marijuana impaired drivers. As long as marijuana use was *per se* illegal, just as is cocaine or PCP use, then the DRE police officer's inability to distinguish between them might be seen as a harmless error.¹⁰¹ But we are now faced with situations where marijuana use is legal.

The Compton study was procedurally flawed and produced results that failed to show that the DRE protocol is based on reliable principles and methods that enable the DRE police officer to identify marijuana impaired drivers. The Compton study employed DRE police officers "with the greatest seniority and skill" in its study, thereby distorting its results.¹⁰² Assuming that the DRE protocol is valid, its most experienced and skilled practitioners should be more accurate in its application than are typical DRE police officers. By minimizing this source of error by typical DRE police officers, Compton inflated his estimate of the accuracy of the DRE protocol.

Compton shared the Adler study's flaw in attempting to do nothing more than to prove that DRE police officers can correctly identify that an illegal drug had been used. In this the DRE police officers in the Compton study failed spectacularly. Compton's DRE police officers "with the greatest seniority and skill" incorrectly identified drivers as having used marijuana 22% of the time.¹⁰³ This false positive rate for identification of marijuana use is consistent with DRE police officer's attempts to identify drivers impaired by drugs other than marijuana, which resulted in false identifications 21% of the time.¹⁰⁴ Even if that error rate were acceptable, it would only serve to establish use, not impairment.¹⁰⁵ Compton forthrightly admitted that "This

⁹⁹ Adler, *supra* note 92, at p. 51.

¹⁰⁰ This is exactly what happened in *State v. Aleman*, 194 P.3d 110, 119 (N.M. App. 2008), where, in a Prohibition Regime, the New Mexico intermediate appellate court ignored these flaws and focused on Adler's almost fictitious 83% accuracy figure. Whatever the merits of such reasoning when marijuana is just as illegal as PCP or amphetamines, it clearly fails once a state legalizes marijuana.

¹⁰¹ *Id.*

¹⁰² Compton, *supra* note 94, at pp. 3 & 5.

¹⁰³ Compton, *supra* note 94, at p. 18.

¹⁰⁴ Compton, *supra* note 94, at p.20.

¹⁰⁵ See *supra* notes 7-17 and associated text.

study was not designed to fully evaluate the DREs ability to discriminate between drivers under the influence of drugs and drug-free drivers.”¹⁰⁶ Compton’s discussion of “DRE Decisions” also conceded that “There is no way to determine objectively whether the suspects were actually too ‘impaired’ to drive safely.”¹⁰⁷ The Compton study does nothing to establish that the DRE protocol is based on reliable principles and methods for the identification of marijuana impaired drivers.

The Bigelow study also was flawed and failed to show that the DRE protocol is based on reliable principles and methods.

The Bigelow study is based on data that was promised to be “reported separately”¹⁰⁸ but, 35 years later, has not yet been made public. Withholding Bigelow’s data aggravates the problem caused by not exposing the study to peer review.

As was the case with the Adler and Compton studies, Bigelow scored a DRE police officer’s performance as accurate even when the officer mis-identified the substance a subject had used, and again focused on use, not impairment.

The Bigelow study was experimental. That is, it did not observe the application of the DRE protocol in the field, but instead tried to re-create field conditions in the lab. The Bigelow study’s experimental re-creation of field conditions significantly biased its results in favor of validating the DRE protocol. Bigelow enlisted 80 male volunteers aged 18 to 35 (certainly not representative of the driving public), who were then “trained on the psychomotor tasks and subjective effect questionnaires used in the study.”¹⁰⁹ Volunteers who did not show “adequate performance” on these tasks during training were not allowed to participate in the study.¹¹⁰ In real life, no person suspected of driving while impaired is given the luxury of advance training to improve their performance on tests administered by the DRE police officer, and no subject is allowed to opt out of these tests because the subject will be falsely classified as impaired simply because they have difficulty passing the tests even when they are unimpaired. In any event, Bigelow’s study design clearly acknowledges the reality that: (1) the DRE protocol’s tests are directed to skills that some people (even when completely sober) are better at than other people, (2) that some people can improve their performance on these tests with practice and training, but some people can’t, and (3) to a significant degree, performance on the DRE skills test is connected to one’s mastery of those skills, not to impairment. By excluding

¹⁰⁶ Compton, *supra* note 94, at p. 23.

¹⁰⁷ Compton, *supra* note 94, at p. 15.

¹⁰⁸ Bigelow, *supra* note 93, at p. 2.

¹⁰⁹ Bigelow, *supra* note 93, at p. 2.

¹¹⁰ Bigelow, *supra* note 93, at p. 2.

this source of error that is inherent in the DRE protocol, the Bigelow study biased itself in favor of validating the DRE protocol.

Bigelow's favorable experimental study design should have guaranteed nearly 100% accuracy by the DRE police officers, but that was not the result. For example, when Bigelow's DRE police officers were asked to evaluate unimpaired subjects who were given a placebo, the officers reported in 5% of these cases that the subjects had used a depressant.¹¹¹ Bigelow also reported that the DRE police officers had difficulty identifying persons who had used marijuana unless the subject was given the highest doses of marijuana.¹¹²

Far from demonstrating that the DRE protocol is based on reliable principles and methods for identifying marijuana impaired drivers, the Bigelow study conceded in its conclusions that its data "indicate a degree of fallibility of the [DRE] evaluation procedure" and that "[t]his laboratory simulation study does not represent a direct test of the validity of these or related behavioral examination procedures for detecting and identifying intoxication in field situations."¹¹³

Both Bigelow and Compton were funded, designed, and executed to show that the DRE protocol is a reliable means for identifying impaired drivers, including marijuana impaired drivers.¹¹⁴ It is telling that neither of them could bring themselves to assert that conclusion and found themselves compelled to admit that they do not show that the DRE protocol is a reliable means for identifying impaired drivers.

Later studies by Heishman *et al.* confirm that the DRE protocol has not been shown to be based on reliable principles and methods that enable DRE police officers to identify marijuana impaired drivers.¹¹⁵ After noting that the DRE protocol is designed to identify drug use, not drug impairment, Heishman *et al.* observed:

Until a broad range of drugs and doses are tested on the [DRE] evaluation and independent performance tests under laboratory conditions, it is difficult to assess the validity of the [DRE] evaluation with respect to behavioral impairment criteria. Such validation is critically needed, however, because *the current means of confirming a DRE's prediction of impairment is the presence of parent drug or metabolite in blood or urine,*

¹¹¹ Bigelow, *supra* note 93, at p. 9.

¹¹² Bigelow, *supra* note 93, at p. 8.

¹¹³ Bigelow, *supra* note 93, at p. 16.

¹¹⁴ See sources cited *supra* note 95.

¹¹⁵ Stephen J. Heishman et al., *Laboratory Validation Study of Drug Evaluation and Classification Program: Ethanol, Cocaine, and Marijuana*, 20 J. ANALYTICAL TOXICOLOGY 468-483(1996).

*which, with the exception of ethanol, provides little, if any, information concerning behavioral impairment.*¹¹⁶

Heishman *et al.* are absolutely correct that the presence of THC in blood provides little or no information concerning behavioral impairment, as is discussed in detail later in this paper.

None of these studies even remotely establishes that the DRE protocol is based on “reliable principles and methods” for identifying marijuana impaired drivers as required by the rule of evidence governing the admission of expert opinion testimony. The method employed by the DRE police officer is built in large part upon amateur medical evaluations conducted in a way that distorts their results – a textbook example of an unreliable method. The attempts to demonstrate the reliability of the DRE protocol as a means of identifying marijuana impaired drivers, whether in the field or in a laboratory setting, have been spectacular failures – a point that almost all of them grudgingly admit. Indeed, each and all of them show that, within the relevant scientific community, the DRE protocol is recognized as an *unreliable* method for identifying marijuana impaired drivers.

b. Admissibility of DRE Police Officer Expert Opinion Testimony Under The Frye Standard

Some states, including a few that have adopted a rule that is substantially identical to F.R.E. 702, have declined to adopt the interpretation of that rule as announced in *Daubert* and its progeny. These states are sometimes known as “*Frye* jurisdictions” because they continue to follow the “general acceptance” test announced in that 1923 case.¹¹⁷ Illinois remains a *Frye* jurisdiction, even though its rule governing the admission of expert testimony is essentially identical to Federal Rule 702.¹¹⁸

The *Frye* general acceptance test has been articulated by the Illinois Supreme Court as follows: “the court’s responsibility is to determine the existence, or nonexistence, of general consensus in the relevant scientific community regarding the reliability of that technique.”¹¹⁹ Under *Frye*’s general acceptance test, the reliability of the principles and methods used by the expert is not irrelevant. Instead, “[t]he determination of the reliability of an expert’s methodology is naturally subsumed by the inquiry into its general acceptance in the scientific community. Simply put, a principle or technique is not generally accepted in the scientific community if it is by nature

¹¹⁶ Heishman *et al.*, *supra* note 115, at 479 (emphasis added).

¹¹⁷ *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923).

¹¹⁸ *In re Commitment of Simons*, 821 N.E.2d 1184 (Ill. 2004); *Donaldson v. Central Ill. Pub. Serv. Co.*, 767 N.E.2d 314 (Ill. 2002).

¹¹⁹ *Simmons*, 821 N.E.2d at 1190.

unreliable.”¹²⁰ Accordingly, the Illinois Supreme Court has concluded that when applying *Frye’s* general acceptance test “the focus is primarily on counting scientists’ votes, rather than on verifying the soundness of a scientific conclusion.”¹²¹

The evaluation of whether the DRE protocol is a proper basis for expert opinion testimony can be informed by the reasoning of cases dealing with the use of techniques that have been proposed as the basis for an expert opinion as to alcohol impairment. For example, in *People v. McKown*¹²² the Illinois Supreme court considered whether the Horizontal Gaze Nystagmus (HGN) test was generally accepted and therefore a valid basis for an expert opinion on the question of alcohol impairment. The *McKown* court followed its precedent in *Simons* and conducted a *de novo* determination of whether the HGN test was generally accepted in the relevant field as a method for identifying alcohol impaired drivers.¹²³ After first noting that identification of impaired drivers in this way is indeed both new and science based,¹²⁴ the *McKown* court rejected the State’s contention that law enforcement officers and agencies are the relevant field within which the test must be generally accepted.¹²⁵ The court concluded that the “acceptance must be determined from the testimony of experts and the literature in the scientific fields.”¹²⁶ As required by its earlier decisions,¹²⁷ the *McKown* court reviewed the testimony of scientists¹²⁸ and the scientific literature (i.e. the *Simons* “counting scientists votes” procedure). The *McKown* court then concluded that scientists generally accepted the HGN test as probative of alcohol impairment.¹²⁹

When this vote counting procedure is applied to the DRE protocol, it decisively fails *Frye’s* general acceptance test. As discussed above, the proponents of DRE police officer opinion testimony offer three studies (Adler, Bigelow, and Compton) in support of the admission of DRE police officer’s opinion testimony on the question of marijuana impairment and

¹²⁰ *Donaldson*, 767 N.E.2d at 326; *McKoen*, 924 N.E.2d at 944.

¹²¹ *Simons*, 821 N.E.2d at 1190.

¹²² *People v. McKown*, 924 N.E.2d 941 (Ill. 2010).

¹²³ *Id.*

¹²⁴ *McKown*, 924 N.E.2d at 953.

¹²⁵ *Id.*

¹²⁶ *Id.*

¹²⁷ *McKown*, 924 N.E.2d at 944.

¹²⁸ *McKown*, 924 N.E.2d at 946. The court excluded a statement by the American Optometric Association, which is “not a scientific body” and noted that optometrists (who prescribe and fit spectacles) are not permitted to make medical diagnoses or to perform surgery, which is done by ophthalmologists. *See infra* note 129.

¹²⁹ As pointed out in the DRE interpretation matrix, HGN is not thought to be an indicator of marijuana impairment – not even by the proponents of the DRE protocol. Thus, the *McKown* court’s acceptance of HGN as an indicator of alcohol impairment does not support the use of the DRE protocol to identify marijuana impairment. *McKown* simply illustrates how *Frye’s* general acceptance test is applied in Illinois.

none of them support the use of the DRE protocol for that purpose – a point that two of these studies candidly point out. Heishman *et al.* is the fourth available study of the use of the DRE protocol to identify marijuana impairment (although it is not generally cited by proponents of DRE police officer testimony) and it also concluded that there is no evidence that the DRE protocol can identify marijuana impaired persons.¹³⁰ There is unanimous agreement in this scientific literature that the DRE protocol has *not* been generally accepted as a means to identify marijuana impaired drivers. It is difficult to imagine a clearer indication that the “general consensus in the relevant scientific community regarding the reliability” of the DRE protocol is that it is *not* “generally accepted” as a valid means for identifying marijuana impaired persons.¹³¹ Thus, in a *Frye* jurisdiction, a DRE police officer should not be allowed to offer an expert opinion on the issue of marijuana impairment.

c. Admissibility of DRE Police Officer Expert Opinions Under a “The Frye-plus” or “Daubert-lite” Standard

Some states, such as New Jersey, have declined to become a “*Daubert* jurisdiction”¹³² by adopting *Daubert’s* interpretation of their state’s counterpart to Rule 702, and yet they acknowledge the wisdom of *Daubert’s* concern that expert testimony be based on reliable methods. Courts in these states are unwilling to let the reliability issue be “subsumed” into the general acceptance test,¹³³ and they undertake the *Daubert*-mandated reliability gatekeeping function in addition to the general acceptance test. This approach is sometimes called “*Frye-plus*” or “*Daubert-lite*.”¹³⁴ The court’s role as the reliability gatekeeper means that “[w]hen a proponent does not demonstrate the soundness of a methodology, both in terms of its approach to reasoning and to its use of data, from the perspective of others within the relevant scientific community, the gatekeeper should exclude the proposed expert testimony on the basis that it is *unreliable*.”¹³⁵

The DRE protocol cannot survive *Frye-plus* or *Daubert-lite* scrutiny. For the reasons discussed above, not only does the DRE protocol lack general acceptance, it is not based on reliable principles and methods.

¹³⁰ Heishman *et al.*, *supra* note 115.

¹³¹ Protestations to the contrary by law enforcement officers and agencies are irrelevant, as they are not part of the relevant body within which the method must be accepted. *McKown*, 924 N.E.2d at 953.

¹³² *In re Accutane Litigation*, 191 A.3d 560, 594 (N.J. 2018).

¹³³ *See supra* note 121 and associated text.

¹³⁴ The Illinois Supreme Court specifically declined to adopt a *Frye-plus* rule in *Donaldson*, 767 N.E.2d at 325-26.

¹³⁵ *Accutane Litigation*, 191 A.3d at 595 (emphasis added).

d. Anomalous Cases and Fallacious Arguments

Some courts have allowed DRE police officers to testify concerning their supposedly expert opinions on the question of marijuana impairment. None of them are precedent that should be followed.

i. The Imbalance Between Defendants and Prosecutors

In many instances, lower courts have allowed DRE police officers to testify as experts without seriously examining the issue of whether their expert opinion testimony should be admitted.¹³⁶ These cases often offer nothing more than a talismanic recitation that the DRE police officer had “relevant skills, experience or training.”¹³⁷ As the Illinois Supreme Court wisely observed in *Simons*, “relying exclusively upon prior judicial decisions to establish general scientific acceptance can be a 'hollow ritual' if the underlying issue of scientific acceptance has not been adequately litigated.”¹³⁸ Once these cases are excluded from consideration, we find that there is a paucity of cases where the issue of the DRE protocol’s ability to identify marijuana impaired drivers has been fully briefed and considered. However, it is worthwhile to examine how it is that there are so many cases that engage in what *Simons* called the “hollow ritual” of admitting purported expert opinions without adequate litigation of the underlying issue of scientific acceptance.

Testimony from purported forensic experts is commonplace in criminal cases. The volume of questionable evidence given by forensic experts prompted a comprehensive survey of the subject by the National Research Council of the National Academy of Sciences. This resulted in the report “Strengthening Forensic Science in the United States”¹³⁹ (the NRC report) that laid bare the many shortcomings of a wide variety of evidence given by forensic experts in criminal cases. The NRC report was not the only effort to cast light on the unreliability of evidence given by a wide range of purported forensic experts. Peter Neufeld, Director of the Innocence Project, published a review of the admission of unreliable expert testimony based on hair

¹³⁶ See, e.g., *People v. Foltz*, 934 N.E.2d 719, 723 (Ill. App. Ct. 2010); *People v. Vanzandt*, 679 N.E.2d 130, 135 (Ill. App. Ct. 1997); *People v. Bitterman*, 492 N.E.2d 582, 584-85 (Ill. App. Ct. 1986); *People v. Jasquith*, 472 N.E.2d 107 (Ill. App. Ct. 1984). These cases were decided under a Prohibition regime. Consequently, the conceded inability of the DRE protocol to identify *impaired* persons (as opposed to mere users) might not have been seen as important – although it certainly was.

¹³⁷ See, e.g., *Foltz*, 934 N.E.2d at 723.

¹³⁸ *Simons*, 821 N.E.2d at 1193.

¹³⁹ NATIONAL RESEARCH COUNCIL. *Strengthening Forensic Science in the United States A Path Forward*. Washington, DC: National Academies Press (2009), <https://doi.org/10.17226/12589> [hereinafter NRC report].

microscopy, serology, bullet lead, and DNA typing.¹⁴⁰ Souviron *et al.* of the Miami-Dade County Medical Examiner's Office published an analysis of the admission of spurious expert testimony based on bite mark evidence.¹⁴¹ Many others have made similar examinations of the evidence given by purported forensic experts. The willingness of courts to admit the testimony of DRE police officers fits comfortably within the larger pattern described by the above authors.

Neufeld directly addresses one of the fundamental reasons why courts admit testimony from purported forensic experts that should not be admitted:

For years in the forensic science community, the dominant argument against regulating experts was that every time a forensic scientist steps into a courtroom, his work is vigorously peer reviewed and scrutinized by opposing counsel. A forensic scientist might occasionally make an error in the crime laboratory, but the crucible of courtroom cross examination would expose it at trial. This "crucible," however, turned out to be utterly ineffective.

....

Why are there so few challenges from criminal defendants' lawyers? Most criminal defendants are indigent. *They are represented by public defenders, contract defenders, and private lawyers paid minimal fees by the government.* In most states, before an assigned counsel can retain an expert to educate him or her, review the opposing expert's data or conduct independent testing, counsel must secure approval from the presiding judge, an elected county official.

....

Unlike the extremely well-litigated civil challenges, the criminal defendant's challenge is usually perfunctory. Even when the most vulnerable forensic sciences—hair microscopy, bite marks, and handwriting—are attacked, the courts routinely affirm admissibility citing earlier decisions rather than facts established at a hearing. Defense lawyers generally fail to build a challenge with appropriate witnesses and new data. Thus, even if inclined to mount a Daubert challenge, they lack the requisite knowledge and skills, as well as the funds, to succeed.¹⁴²

¹⁴⁰ Peter J. Neufeld, *The (Near) Irrelevance of Daubert to Criminal Justice and Some Suggestions for Reform*, 94 AM. J. PUB. HEALTH S107-13 (2005).

¹⁴¹ Richard Souviron et al., *Bite Mark Evidence: Bite Mark Analysis is Not the Same as Bite Mark Comparison or Matching or Identification*, 4 J. L. AND BIOSCIENCES, 617-22, doi:10.1093/jlb/lxx026.

¹⁴² Neufeld, *supra* note 140, at pp. S109-S110 (emphasis added).

The NRC report, writing after an examination of the cases, concluded that:

The reported decisions dealing with judicial dispositions of Daubert type questions appear to confirm [Neufeld's] assessment. As noted above, the courts often "affirm admissibility citing earlier decisions rather than facts established at a hearing." Much forensic evidence — including, for example, bite marks and firearm and toolmark identifications — is introduced in criminal trials without any meaningful scientific validation, determination of error rates, or reliability testing to explain the limits of the discipline.¹⁴³

In short, even though their personal liberty is at stake, with potentially lifelong consequences, the typical criminal defendant lacks the financial, legal, and technical resources to adequately challenge testimony from purported forensic experts. A visit to any of the thousands of courtrooms where defendants in marijuana DUI cases are convicted based on DRE police officer testimony will confirm that this is indeed true.

This juggernaut is fueled by more than just a lack of defendant's resources. Prosecutors are often aided by a small army of eager but unqualified persons who offer their testimony to validate invalid forensic theories and techniques. Souviron *et al.* are forensic odontologists with the Miami-Dade County Medical Examiner and they describe the frequent attribution of unjustified forensic significance to bite mark evidence. They attribute this in large part to a group of compliant dentists, who have bent their testimony to support police and prosecution's desire to rely on bite mark evidence to prove facts that, as a matter of science, bite mark evidence simply cannot prove.¹⁴⁴ "Many dentists, with no training at all, stepped into a job that could not actually be done, but they were delighted to be part of the prosecution team with, in some cases, disastrous consequences."¹⁴⁵ See also, the discussion below of the role of optometrists in connection with DRE police officer testimony. The lure of being part of the "team" that puts away the bad guys is apparently irresistible, and police and prosecutors are more than willing to accept this eagerly offered assistance — no matter how poorly qualified the source.

It is no surprise that even when defendants challenge the admissibility of this testimony those challenges generally fail.¹⁴⁶ The result is a long list of reported cases that engage in the hollow ritual of admitting proffered

¹⁴³ NRC report, *supra* note 139, at pp. 107-108.

¹⁴⁴ Souviron et al., *supra* note 141, at p 621.

¹⁴⁵ Souviron et al., *supra* note 141, at p 621.

¹⁴⁶ D. Michael Risinger, *Navigating Expert Reliability: Are Criminal Standards of Certainty Being Left on the Dock*, 64 ALB. L. REV. 99 (2000).

testimony from purported forensic experts after an ineffective defense challenge. Courts simply make a rote acknowledgement of earlier cases where similar testimony was admitted, with none of them engaging in a serious examination of the expert's underlying methods or qualifications. The frequent admission of DRE police officer opinion testimony is but another instance of this common occurrence.

ii. DRE Protocol Supporters Who Testify Outside Their Sphere of Competence

The role of optometrists (and a few other groups) in this area is worth some discussion. Optometrists are persons who are licensed to diagnose vision disorders (e.g. nearsightedness), prescribe corrective lenses for those disorders, and, in some states, remove foreign objects from the eye.¹⁴⁷ Optometrists should not be confused with ophthalmologists, who are medical doctors. Diagnosis of impairment is not within the scope of optometric practice. Even so, optometrists have eagerly sought a role in this area. The American Optometric Association recently adopted a resolution alerting optometrists to the business opportunity to become a professional consultant in the use of HGN field sobriety testing. In regards to that resolution, the Illinois Supreme Court acutely observed, “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.”¹⁴⁸ In short, the American Optometric Association resolution urges its members to view assisting police in connection with impairment cases as a business opportunity, not a scientific or professional issue.

Optometrists apparently recognize that ophthalmologists (who are physicians and would be competent to evaluate impairment) have not

¹⁴⁷ See, e.g., NY EDUC. LAW § 7101 “The practice of the profession of optometry is defined as diagnosing and treating optical deficiency, optical deformity, visual anomaly, muscular anomaly or disease of the human eye and adjacent tissue by prescribing, providing, adapting or fitting lenses or by prescribing, providing, adapting or fitting non-corrective contact lenses . . .”; N.J.S.A. § 45:12-1 “[T]he practice of optometry is defined to be the employment of objective or subjective means, or both, for the examination of the human eye and adnexae for the purposes of ascertaining any departure from the normal, measuring its powers of vision and adapting lenses or prisms for the aid thereof, . . . including the removal of superficial foreign bodies from the eye and adnexae.”; Ill. Optometric Practice. Stat. § 3 “The practice of optometry is defined as the employment of any and all means for the examination, diagnosis, and treatment of the human visual system, the human eye, and its appendages without the use of surgery, including, but not limited to: the appropriate use of ocular pharmaceutical agents; refraction and other determinants of visual function; prescribing corrective lenses or prisms; prescribing, dispensing, or management of contact lenses; vision therapy; visual rehabilitation . . .”

¹⁴⁸ See, *McKown*, 924 N.E.2d at 951.

supported optometrists' work with police in connection with the DRE protocol. Optometrists have attempted to compensate for this by claiming to "have a better feel for the test" than do the better and more broadly trained ophthalmologists.¹⁴⁹ Optometrists and their supportive testimony can be found wherever the expert status of a DRE police officer is questioned.¹⁵⁰ The limited scope of their professional competence and their very plain business conflict should be enough to completely discount their testimony in support of the DRE protocol.

If one were to allow optometrists to testify in support of the DRE protocol's ability to identify marijuana impaired drivers, their testimony would certainly have to be limited to matters involving the eye – e.g. the HGN and VGN tests. But the DRE protocol's instruction materials and its interpretation matrix unequivocally state that HGN and VGN are normal in persons who have used marijuana.¹⁵¹ The DRE protocol's purported ability to identify marijuana use (if not impairment) rests on diagnostic features almost completely outside an optometrist's professional competence. Their testimony in support of the DRE protocol's ability to identify marijuana impairment must be excluded.

iii. Is It Non-Science or Nonsense?

An interesting argument is sometimes advanced in support of the admissibility of DRE police officer's opinion testimony: it is admissible because it is not based on science, and the rules of evidence concerning the admissibility of opinion testimony (e.g. Rules 701 and 702, as well as *Daubert* and *Frye*) do not apply to testimony based on non-science. Under this argument, because the DRE police officer's opinion on marijuana impairment is not based on science, but is instead based on some other thing (sometimes called "specialized knowledge" or "experience" or "police

¹⁴⁹ *McKown*, 924 N.E.2d at 947 (in the context of alcohol impairment).

¹⁵⁰ For example, optometrist Karl Citek has testified in an astonishing number of alcohol and drug impairment cases. For example, *State v. Daly*, 775 N.W.2d 47 (Neb. 2009); *State v. Aleman*, 194 P.3d 110 (N.M. App. 2008); *State v. Downing*, 366 P.3d 1171 (Or. App. 2016); *State v. Baity*, 991 P.2d 1151 (Wash. 2000); *People v. McKown*, 924 N.E.2d 941 (Ill. 2010); *State v. Brewer*, 2020 WL 1672958 (Tenn. Crim App.); *State v. Burkette*, 2015 WL 4943909 (Or. App.); *State v. Duplechain*, 2014 WL 5112665 (Wis. App.); *State v. Downing*, 2013 WL 9903354 (Or. App.); *Brown v. State*, 2008 WL 2491805 (Mont.). Citek's resume filed in *Reiver v. District of Columbia*, Case 1:10-cv-01527-ABJ Doc. No. 43-1 Filed Jan. 23, 2012 includes a three-page, single spaced list of cases in which he had testified as of 2012. Citek's resume also includes a five and a half page, single spaced list of DRE courses and seminars that he has taught. Without doubting that all of this testimony and assistance to DRE police officers was offered out of sincere conviction, that sincere conviction is not itself a qualification and does not expand the scope of optometric training or practice. If anything, it is an example of a particularly eager self-validating expert cautioned against in *Accutane Litigation*, which is discussed below at note 161 and associated text

¹⁵¹ See, Fig. 1, the DRE interpretation matrix.

training”), the rules governing expert opinions do not apply to their expert opinion testimony.

A good example of this approach is *State v. Aleman*.¹⁵² In *Aleman*, a DRE police officer’s expert opinion testimony was challenged as being inadmissible under Rule 702.¹⁵³ After noting that the DRE police officer’s testimony concerning what the DRE police officer observed when applying the DRE protocol to the subject “would be meaningless without the DRE’s ability to interpret those observations,” the court went on to consider whether the DRE police officer’s interpretations (i.e. opinions) could be admitted.¹⁵⁴ The court noted that Rule 702 allows experts to give opinion testimony based on their “scientific, technical, or *other specialized knowledge*,”¹⁵⁵ and treated “specialized knowledge” as a separate category.¹⁵⁶ “This sort of testimony is more than lay opinion testimony under Rule 11-701, but it is also less than scientific testimony under Rule 11-702.”¹⁵⁷ The *Aleman* court went on to adopt what is in effect a “Rule 701 ½,” a middle-ground rule of evidence under which non-science expert opinions can be admitted without being subjected to either a *Frye* or a *Daubert* analysis.¹⁵⁸ This approach ignores the plain language of Rule 702, which subjects all opinion testimony based on “scientific, technical, or other specialized knowledge” to its admissibility requirements. The U.S. Supreme Court in *Kumho* rejected this proposed creation of an exception for “specialized knowledge” expert opinion testimony:

[Rule 702] makes no relevant distinction between ‘scientific’ knowledge and ‘technical’ or ‘other specialized’ knowledge. It makes clear that any such knowledge might become the subject of expert testimony. . . . Hence, as a matter of language, the Rule applies its reliability standard to all ‘scientific,’ ‘technical,’ or ‘other specialized’ matters within its scope.¹⁵⁹

Whatever its general merit, the extraction of non-science, “specialized knowledge” from Rule 702 and the creation of a non-textual, middle-ground rule of evidence under which non-science expert opinions can be admitted poses a subtle but grave danger as it is applied in the specific context of DRE police officer opinion testimony. As *Aleman* explains: “the DREs were appropriately qualified as experts because the State established that they had undergone extensive training and had significant experience in the

¹⁵² *State v. Aleman*, 194 P.3d 110 (N.M. Ct. App. 2008).

¹⁵³ *Id.* at 113 (specifically, New Mexico’s Rule 11-702).

¹⁵⁴ *Id.* at 117.

¹⁵⁵ FED. R. EVID. 702(a) (emphasis added).

¹⁵⁶ *Aleman*, 194 P.3d at 117.

¹⁵⁷ *Id.*

¹⁵⁸ *Id.*

¹⁵⁹ *Kumho*, 526 U.S. at 147.

administration of the Protocol.”¹⁶⁰ That is, the *Aleman* court allowed DRE police officers to render an expert opinion based on the DRE protocol simply because they were well trained in the DRE protocol, *not* because the DRE protocol is either a reliable or a generally accepted method for identifying impaired drivers. *Aleman* acknowledged that this non-textual middle-ground rule would not be sufficient under Rule 702 to qualify an expert who testifies on the basis of science, but *Aleman* accepted it as sufficient for non-science, “specialized knowledge” experts.

The practical consequence of this approach is to allow DRE police officers to designate themselves as experts based on nothing more than their diligence in embracing their own characterization of themselves as experts. This is the very result that the rules of evidence seek to prevent. As the New Jersey Supreme Court has wisely observed, when asked to accept the admissibility of proffered expert opinion testimony courts have “the obligation to distinguish scientifically sound reasoning from that of the self-validating expert.”¹⁶¹ *Aleman* not only admitted this testimony, it endowed it with the undeserved credibility of an expert.

iv. Building A House of Cards

Sometimes, several of the above flaws are woven in to a single case. In *State v. Baity*,¹⁶² the Washington Supreme Court concluded that the DRE interpretation matrix (which the court called the “drug chart”) could be used as the basis for DRE police officer opinion testimony.¹⁶³ The principal reason offered by the *Baity* court was that one witness testified that the chart was generally accepted in the scientific community, apparently finding that witness more credible than witnesses who offered contrary testimony.¹⁶⁴ The *Baity* court mentioned the DRE studies discussed above but never considered their actual results, including their conceded failure to demonstrate the DRE protocol’s ability to identify impaired drivers and their very high error rate even when only attempting to identify drug use (as opposed to impairment).¹⁶⁵ Also, when considering the “general acceptance” issue, the *Baity* court included among the relevant scientific community optometrists and forensic specialists, noting the endorsements of the American Optometric Association and the International Association of Chiefs of Police,

¹⁶⁰ *Aleman*, 194 P.3d at 117.

¹⁶¹ *Accutane Litigation*, 191 A.3d at 589.

¹⁶² *State v. Baity*, 991 P.2d 1151 (Wash. 2000).

¹⁶³ *Id.* at 1160.

¹⁶⁴ The *Baity* court also mentioned that the American Psychiatric Association’s DSM and the *Physician’s Desk Reference* classify drugs by their characteristics. This practice of grouping drugs was said to support both the grouping used in the DRE interpretation matrix and the validity of the interpretive factors used in the matrix. No reasoning was offered to justify those leaps.

¹⁶⁵ *Baity*, 991 P.2d at 1160.

as well as the fact that the DRE protocol originated with the Los Angeles police.¹⁶⁶ Thus, the *Baity* case is an instance where (1) the merits of the reliability and general acceptance of the DRE protocol were not fully explored, (2) the court relied on irrelevant optometrist testimony, and (3) the court allowed police to become self-validating, non-science experts.

The Oregon Court of Appeals considered the admissibility of DRE police officer opinion testimony in *State v. Sampson*.¹⁶⁷ To its credit, the *Sampson* court rejected the state's argument that the police are qualified to validate their own DRE protocol as a reliable method for identifying marijuana impairment, noting that "Police officers are normally competent to testify concerning matters within the province of their own training and experience, including observational techniques that are part and parcel of the DRE protocol; they may not, however, validate its underlying scientific basis."¹⁶⁸ However, from that point on, *Sampson* went astray. The court was presented with testimony from two physicians: Dr. Burton, who testified that "the DRE protocol was not generally accepted by the toxicology community [and Dr.] Bovee, a physician who specializes in treating addiction, testified that he, personally, would not make a diagnosis or conclusion based on the DRE protocol."¹⁶⁹ The *Sampson* court instead relied heavily on testimony from the frequently-testifying optometrist Karl Citek¹⁷⁰ that "*his* scientific community considers the [DRE] protocol reliable and valid,"¹⁷¹ a clear concession that he speaks only of the views of optometrists. The *Sampson* court also received the testimony of an unnamed non-physician "drug and alcohol researcher" that the [DRE] protocol is "accepted by . . . those people who understand what the program is and are in a position to evaluate it."¹⁷² – which is apparently the way that this anonymous *non-physician* says that the *physicians* who disagree with him concerning the diagnosis of marijuana impairment don't really understand either marijuana impairment or how marijuana impairment is diagnosed. Finally, the *Sampson* court noted the testimony of a physician who teaches the DRE protocol to police officers but apparently could not bring himself to forthrightly say that the DRE protocol is a reliable means of identifying marijuana impairment, and only managed to offer the oddly hedged statement that he "considers it valid 'for law enforcement use.'"¹⁷³ The Court of Appeals in *Sampson* offered no explanation of why law enforcement should operate under its own lesser, "good enough for law enforcement use" standard of reliability, or why people

¹⁶⁶ *Id.*

¹⁶⁷ *State v. Sampson*, 6 P.3d 543 (Or. App. 2000).

¹⁶⁸ *Id.* at 553.

¹⁶⁹ *Id.*

¹⁷⁰ *See supra* note 151.

¹⁷¹ *Sampson*, 6 P.3d at 553 (emphasis added).

¹⁷² *Id.*

¹⁷³ *Id.*

should be incarcerated on the basis of such evidence – especially when the rules of evidence, properly applied, would exclude that evidence.

3. DRE Police Officer Testimony as a Lay Opinion.

As was noted earlier, courts have been hesitant to admit lay opinions concerning the ultimate question of marijuana impairment. Moreover, proponents of opinion testimony from DRE police officers have always sought to surround that testimony with the persuasive aura that comes with the status of an expert. Police have never sought to re-brand DRE's as "Drug Recognition Laypersons" or "DRL's."

On the other hand, the rationale for excluding lay opinions on the question of marijuana impairment has always been that lay persons have insufficient experience observing persons who are in a state of marijuana impairment to be able to form a rationally based opinion on the impairment issue. As more states legalize recreational marijuana and as lay persons accumulate experience under these new laws, this rationale may lose its force. There is no way to know when this point may be reached. However, the beginnings of an acceptance of lay opinions on the marijuana intoxication issue may have already emerged.

In *State v. Klawiter*, the Minnesota Supreme Court wrestled with the admissibility of DRE police officer opinion testimony in marijuana impairment cases. In *Klawiter*, the court examined the DRE protocol, and concluded that:

[The DRE] training is not designed to qualify police officers as scientists but to train officers as observers. *The training is intended to refine and enhance the skill of acute observation which is the hallmark of any good police officer* and to focus that power of observation in a particular situation. . . . To put it a different way, the protocol, in the main, dresses up in scientific garb that which is not particularly scientific. Calling an officer trained in the art of observation pursuant to the protocol a "Drug Recognition Expert" seems to us to assume the conclusion.

In general, it seems to us misleading for the state to present the officer as a 'Drug Recognition Expert.' . . . *Therefore, in the courtroom the officer shall not be called a "Drug Recognition Expert."*¹⁷⁴

The *Klawiter* decision moved the DRE police officer into a new category: an expert who may not be called an expert because their testimony is simply based the observational skills that any good police officer has.¹⁷⁵

¹⁷⁴ *Klawiter*, 518 N.W.2d at 585 (emphasis added).

¹⁷⁵ *Id.*

Under *Klawiter*, the DRE police officer is a *tertium quid*, neither a lay witness nor an expert.

In some ways, this makes good sense even though this category of “non-expert experts” has no basis in the rules of evidence. The DRE protocol cannot pass muster as the “reliable method” required by Rule 702, and it cannot be said to be “generally accepted” by anyone other than police and a cadre of compliant optometrists and the like who support them. And yet, the DRE protocol does add structure and regularity to the observational skills of a good police officer – no small contribution. While this structure and regularity has failed to enable the DRE police officer to offer a reliable opinion on the ultimate question of marijuana impairment, it may serve as the beginning of a search for that structure. There would be value in an observational structure that can usefully enhance the reliability of the factual testimony that the DRE police officer provides (e.g. slurred speech, stumbling, admissions by the subject). If lay opinion testimony concerning marijuana impairment is eventually allowed, an improved structure based on the DRE protocol may also serve to limit the variability and bias to which lay opinions are susceptible.

E. Biochemical Proxies for Marijuana Impairment

The success of Dr. Haddon’s work establishing 0.08% BAC as a proxy for alcohol impairment naturally led to interest in finding a biochemical proxy for marijuana intoxication that would serve as the basis for a *per se* marijuana impairment statute. In its 1985 “Consensus Report,” the American Medical Association endorsed the search for a scientifically valid proxy for marijuana impairment.¹⁷⁶

Tetrahydrocannabinol (THC) is commonly understood to be the psychoactive compound responsible for marijuana impairment,¹⁷⁷ although there is strong evidence that it is not the only such compound.¹⁷⁸ This has led some to assume that blood THC concentration can be a biochemical proxy for marijuana intoxication, just as is BAC. However, appealing this belief may be, it is unsupported by science. Published studies have failed to show any useful or meaningful correlation between blood THC concentration and impairment.

¹⁷⁶ American Medical Association, JAMA Nov. 8, 1985 Vol. 254, No. 18.

¹⁷⁷ John Gonçalves et al., *Cannabis and Its Secondary Metabolites: Their Use as Therapeutic Drugs, Toxicological Aspects, and Analytical Determination*, MEDICINES, 2019, 6, 31; Shelby L. Blaes et al., *Enhancing Effects of Acute Exposure to Cannabis Smoke on Working Memory Performance*, NEUROBIOL LEARN MEM. Jan. 2019 157:151-162.

¹⁷⁸ Gonçalves et al., *supra* note 177; Blaes et al., *supra* note 177. Indeed, some researchers have been granted patents on the therapeutic psychoactive uses of these other compounds. e.g. U.S. Pat. No. 10,279,000.

In 2015, the National Highway Traffic Safety Administration (NHTSA) studied 3,000 single car crashes (similar to Dr. Haddon's alcohol impairment work) and found almost no correlation between crash risk and the presence of THC. NHTSA found that marijuana users strongly tend to be drawn from groups of people who are otherwise likely to be in an accident (e.g. teenage males), and the NHTSA data showed that marijuana use did not increase their likelihood of being in an accident above the likelihood associated with the risk factors of age, gender, ethnicity, and alcohol use.¹⁷⁹ The NHTSA study found that, when these other factors were accounted for, blood THC was not correlated with an increased crash risk (expressed as the Adjusted Odds Ratio), but that other drugs were closely correlated with an increase in crash risk.¹⁸⁰

In 2016, the American Automobile Association (AAA) published a study of THC blood levels in drivers thought to be impaired. The AAA study concluded that “[I]mpairment cannot be inferred based solely on blood THC concentration.”¹⁸¹ Battistiella *et al.* studied THC blood levels and driving skills in 2013 and reported that their data “failed to indicate a statistically significant” correlation between THC concentration and driving skills.¹⁸² In 2010, Lenné *et al.* attempted to find a dose-response relationship between blood THC and driving impairment, but were unable to do so, admitting that their data “failed to reach statistical significance.”¹⁸³ Karschner *et al.* conducted their own study and also surveyed the literature in search of a correlation between blood THC levels and driving skills and euphemistically summarized their findings as that “defining the relationship between THC blood concentrations and performance decrements has been challenging” and noted that numerous studies have failed to find a correlation between increased accident risk and the presence of cannabinoids in blood.¹⁸⁴ Lowenstein *et al.* undertook a study of the blood levels of alcohol, THC, and a variety of other drugs in drivers involved in 414 Colorado automobile

¹⁷⁹ Richard P. Compton and Amy Berning, *Drug and Alcohol Crash Risk*, U.S. DEP'T OF TRANSP., NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., (Feb. 2015), https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/812117-drug_and_alcohol_crash_risk.pdf.

¹⁸⁰ *Id.* at 5.

¹⁸¹ Ali Rowhani-Rahbar *et al.*, *Cannabis Use Among Drivers Suspected Of Driving Under The Influence Or Involved In Collisions: Analysis Of Washington State Patrol Data*, AAA FOUNDATION (May 2016), <https://aaafoundation.org/cannabis-use-among-drivers-suspected-driving-influence-involved-collisions-analysis-washington-state-patrol-data/>.

¹⁸² Giovanni Battistella *et al.*, *Weed or Wheel! fMRI, Behavioural, and Toxicological Investigations of How Cannabis Smoking Affects Skills Necessary for Driving*, PLOS ONE, Jan, 2, 2013, at 13, doi:10.1371/journal.pone.0052545.

¹⁸³ Michael G. Lenné *et al.*, *The Effects of Cannabis and Alcohol on Simulated Arterial Driving*, 42 ACCIDENT ANAL. & PREV. 859, 865 (2010).

¹⁸⁴ Erin L. Karschner *et al.*, *Do Δ9-Tetrahydrocannabinol Concentrations Indicate Recent Use in Chronic Cannabis Users?*, 104 ADDICTION, 2041, 2045 (2009), doi:10.1111/j.1360-0443.2009.02705.x.

crashes that resulted in personal injuries and found that “controlling for age, gender, seat belt use, and other confounding variables, only alcohol [not THC] predicted crash responsibility.”¹⁸⁵ Papafotiou *et al.* actually found a negative correlation between blood THC concentration and impairment. That is, Papafotiou *et al.* observed little or no impairment when blood THC concentration was highest, and impairment was not manifested until well after blood THC had declined well below its peak level,¹⁸⁶ leading them to conclude that “the level of THC in the blood does not provide an accurate and reliable indicator whether driving performance is impaired.”¹⁸⁷ Battistella *et al.* observed this same effect.¹⁸⁸ Professor Roth surveyed eleven studies of the relationship between blood THC levels and crash risk and concluded that “there is simply no established predictable or linear relationship between THC blood levels and relative crash risk”¹⁸⁹ Reisfield *et al.* also surveyed the field and bluntly observed that the idea of a *per se* impairment rule based on a blood THC concentration that can be used as a biochemical proxy for impairment (equivalent to the 0.08% BAC proxy for alcohol impairment) is a “mirage.”¹⁹⁰

Why is it that the blood levels of THC are not correlated with impairment? The answer is not entirely known, and may be the result of a combination of factors. Impairment may not be caused by THC, but rather by its metabolites (e.g. THCC or THC-COOH).¹⁹¹ Habitual or long-term users of marijuana develop a tolerance to marijuana and may not exhibit impairment at blood levels that will impair naive users.¹⁹² There may also be a difference between marijuana’s effect on men and women.¹⁹³ Papafotiou *et*

¹⁸⁵ Steven R. Lowenstein *et al.*, *Drugs and Traffic Crash Responsibility – A Study of Injured Motorists in Colorado*, 50 J. TRAUMA INJ., INFECTION, AND CRITICAL CARE 313, 318 (2001).

¹⁸⁶ K. Papafotiou *et al.*, *The Relationship Between Performance on the Standardized Field Sobriety Tests, Driving Performance and the Level of Δ9-tetrahydrocannabinol (THC) in Blood*, 155 FORENSIC SCI. INTL., 172 (2005).

¹⁸⁷ Papafotiou *et al.*, *supra* note 186, at 178.

¹⁸⁸ Battistella *et al.*, *supra* note 182.

¹⁸⁹ Roth, A. *supra* at p. 909. Prof. Roth noted that only one of the eleven studies showed any association between THC concentration and crash risk, but that study used a statistically insignificant sample size and was plagued by other confounding factors.

¹⁹⁰ Gary M. Reisfield *et al.*, *The Mirage of Impairing Drug Concentration Thresholds: A Rationale for Zero Tolerance Per Se Driving Under the Influence of Drug Laws*, 36 J. ANAL. TOXICOL., 354, 353-56 (2012).

¹⁹¹ See *supra* notes 178 & 179.

¹⁹² Kim Wolff & Atholl Johnston, *Cannabis Use: A Perspective in Relation to the Proposed UK Drug-Driving Legislation*, DRUG TESTING ANALYSIS 143, 147 (2014); Kristin Wong *et al.*, *Establishing Legal Limits for Driving Under the Influence of Marijuana*, INJ. EPIDEMIOLOGY, Oct. 2014 at 2-81:26; Battistella *et al. supra*; W. M. Bosker *et al.*, *A Placebo-Controlled Study to Assess Standardized Field Sobriety Tests Performance During Alcohol and Cannabis Intoxication in Heavy Users and Accuracy of Point of Collection Testing Devices for Detecting THC in Oral Fluid*, 223 PSYCHOPHARMACOLOGY (Berl), 439 (2012).

¹⁹³ M. E. Wall *et al.*, *Metabolism, Disposition, and Kinetics of Delta-9-tetrahydrocannabinol in Men and Women*, 34 CLINICAL PHARMACOLOGY & THERAPEUTICS, 352 (1983).

al. and Battistella *et al.* have independently reported that there may be a lag time between when THC appears in blood and when THC enters the brain, putting blood THC levels out of synch with the occurrence of impairment.¹⁹⁴ Reisfield *et al.* point out several biochemical properties of psychoactive drugs such as marijuana that make it difficult to construct a Haddon-type bright line blood level test for marijuana impairment.¹⁹⁵ This is consistent with Sewell's general observation that marijuana's effects are more variable than those of alcohol.¹⁹⁶ Some or all of these factors, and perhaps others, may account for the inability of science to find a valid biochemical proxy for marijuana impairment. In any event, it is clear that there is as yet no scientific basis for using THC blood level as the basis for a *per se* rule for determining marijuana impairment.

This has not kept some jurisdictions from adopting statutes setting *per se* rules for THC blood concentrations as proof of impairment. For example, Illinois has set a 5 ng/ml blood THC limit,¹⁹⁷ as has Washington State.¹⁹⁸ The studies described above show that there is no scientific basis for the use of any THC blood concentration as a proof of impairment. Moreover, attempts to justify the specific 5ng/ml concentration used in these statutes have shown that “No significant differences were detected in the incidence of moving violations or any specific type of moving violation between drivers with blood THC quantified ≥ 5 [ng/ml] and those with THC ≤ 5 [ng/ml].”¹⁹⁹

The adoption of *per se* rules for THC blood concentration as a biochemical proxy for impairment has been described as the product of a purely political calculation designed to mollify opponents of marijuana legalization by mimicking the pattern established for alcohol by Dr. Haddon.²⁰⁰ Given the absence of a scientific basis for these *per se* rules, their adoption as a matter of political expediency, or for any other reason, must be seen as misguided.

V. A PROPOSED WAY FORWARD

¹⁹⁴ Papafotiou *et al.*, *supra* note 186, at p. 177; Battistella *et al.*, *supra* note 182.

¹⁹⁵ Reisfield *et al.* *supra* note 190, at p. 353.

¹⁹⁶ R. Andrew Sewell *et al.*, *The Effect of Cannabis Compared with Alcohol on Driving*, AM. J. ADDICTION, May 2010, at 185-93.

¹⁹⁷ 625 ILL. COMP. STAT. 5/11-501(A)(7) & 5/11-501.2(A)(6) (2020).

¹⁹⁸ WASH. REV. CODE § 69.50.401 (2015).

¹⁹⁹ Rebecca L. Hartman *et al.* “Drug Recognition Expert (DRE) Examination Characteristics of Cannabis Impairment,” 92 Accident Analysis and Prevention 219, 223 (2016) (emphasis added).

²⁰⁰ See, Roth *supra* note 189, at 894.

An examination of the limits and flaws of current practice is helpful only if it informs action toward better and fairer enforcement of the laws against impaired driving. The following suggestions are offered to that end.

A. Making Development of a Biochemical Proxy for Impairment Part of the Legislation That Establishes Regulated Use of Marijuana

States that have moved from a Prohibition to a Regulated Use Regime have done so with the understanding that, like alcohol use, marijuana use comes with social costs – costs that are acceptable only because they are less than the costs of prohibition. This does not mean that states must be passive in response to the social costs of Regulated Use of marijuana. Indeed, it would be wise to take the initiative to limit the social costs of marijuana use – including marijuana impaired driving – and to do so concurrently with the shift to a Regulated Use Regime.

Regulated Use states tax marijuana growth, distribution, and sale, with each state setting its own tax rate and applying that tax on selected points along the chain of commerce. Revenues from those taxes are earmarked for various purposes, most relating to social costs of marijuana regulation. Tax revenue from Pennsylvania’s medical marijuana program is directed to subsidies for medical marijuana users in financial need, drug abuse prevention and counseling, research into medical uses of marijuana, and local police (e.g. DRE programs).²⁰¹ Illinois directs its marijuana tax revenue to drug abuse prevention programs, the Illinois “R3 Program” (which assists communities impacted by the “war on drugs”), drug education programs, and police.²⁰² Nevada earmarks its marijuana tax revenue for schools.²⁰³

Taxation of marijuana products may never be the budget-balancing bonanza that some expected it to be,²⁰⁴ but it can surely generate enough money to allow a portion to be dedicated to funding the scientific research needed to identify a biochemical proxy for marijuana impairment, akin to the 0.08% BAC proxy for alcohol impairment developed by Dr. Haddon.

²⁰¹ 35 PA. CONS. STAT. § 10231.902 (2016).

²⁰² Illinois Pub. Act 101-0027 §5.894 (allocating four times as much to police as to drug abuse education).

²⁰³ NEV. REV. STAT. § 453D.510 (2020).

²⁰⁴ Naomi Martin, *Windfall, They Said. Why Massachusetts Marijuana Taxes Are Disappointing So Far*, BOSTON GLOBE (Mar. 19, 2019) <https://www.bostonglobe.com/news/marijuana/2019/03/19/windfall-they-said-why-massachusetts-marijuana-tax-collections-are-disappointing/uX8UHvOvKQSmNZFsnIi93I/story.html>; Bill Chappell, *California Says Its Cannabis Revenue Has Fallen Short Of Estimates*, NAT’L PUB. RADIO (Aug. 23, 2019) <https://www.npr.org/2019/08/23/753791322/california-says-its-cannabis-revenue-has-fallen-short-of-estimates-despite-gains>; Bernie Becker, *Cannabis Was Supposed to Be A Tax Windfall For States. The Reality Has Been Different*, POLITICO: THE AGENDA (Oct. 14, 2019), <https://www.politico.com/agenda/story/2019/10/14/marijuana-tax-revenue-001062/>.

The allocation of a portion of marijuana tax revenue towards finding a scientifically valid way of dealing with what may be the most important social cost of marijuana use makes sense. A scientifically valid, legally admissible, practically useful biochemical test for marijuana impairment could revolutionize this field, giving true legitimacy to the enforcement of marijuana impairment laws. There is no reason to think that this biochemical proxy for marijuana impairment does not exist. All that is lacking are the will and the funding to do the science that is necessary to find it.

A legislative proposal that implements this suggestion can be found at Appendix A to this paper. While this specific proposal may not be suitable for immediate adoption in all states that have a Regulated Use Regime, it is hoped that it will encourage serious consideration of this idea and serve as a starting point for state-specific enactments.

B. A Proposal for Testimonial Evidence in Marijuana Impairment Cases

For the reasons discussed above, DRE police officers should not be permitted to offer expert opinions on the ultimate question of marijuana impairment. This does not mean that DRE police officers should not testify in marijuana impairment cases.

DRE police officers can offer valuable factual testimony in marijuana impairment cases, and this testimony should be welcomed. The DRE police officer's observation of the subject and the subject's behavior should be admissible as part of the officer's factual testimony concerning the impairment issue.

However, a predicate to the admissibility of the DRE police officer's observations must be that they are conducted and presented in a standardized way so as to eliminate, or at least minimize, personal variations and bias. The DRE protocol is a useful starting point for this standardization process, but is by no means sufficient. The DRE protocol must be purged of its inappropriate components, such as roadside diagnoses of possible paranoia, checking vital signs in a manner & environment that distorts them, "feeling" muscle tone, and "munchie" indicators. The worthy components of the current DRE protocol, along with others that may be added based on sound science, together with the growing use of technology such as bodycams, can enable police and prosecutors to effectively enforce the impaired driving laws fairly, consistently, and without bias.

DRE police officers should not be allowed to hold themselves out as "experts." Indeed, the DRE label should be discarded. When these police officers testify, they should do so on the basis of facts that they personally observed using "the skill of acute observation which is the hallmark of any

good police officer.”²⁰⁵ The aura of believability around their testimony must be that of their professionalism.

Discarding the false credibility of the DRE protocol may make it less easy for police and prosecutors to obtain convictions for marijuana impaired driving. This is no reason for preserving an unprincipled *status quo*. As the Illinois Supreme Court noted when it affirmed the dismissal of a marijuana possession case for lack of sufficient evidence:

One of the chief safeguards of our liberty is the requirement that, before punishing an individual as a criminal, the executive branch of government must prove to the satisfaction of the judicial branch of government that the individual has violated the laws enacted by the legislative branch of government. Any relaxation of this standard poses the gravest possible threat to our most basic institutions. While we must also take care not to unnecessarily impede the State from dealing effectively with the vexatious problems of illegal drug traffic which plague our society, the requirement that the State provide more substantial evidence than it did here is but a minor burden.²⁰⁶

²⁰⁵ *Klawiter*, 518 N.W.2d at 585.

²⁰⁶ *People v. Park*, 380 N.E.2d 795, 800 (Ill. 1978) (citations omitted).

APPENDIX A

LEGISLATIVE PROPOSAL FOR FUNDING RESEARCH INTO
A BIOCHEMICAL INDICATOR OF MARIJUANA IMPAIRMENT

§ 1 Use of Tax Revenue. All monies paid as taxes under this Act shall be used and are appropriated as follows:

- (a) to pay all direct and indirect expenses of the Department in administering this Act.
- (b) of all monies in excess of the expenses identified in §1(a):
 - (i) ten percent (10%) to Sponsored Research Grants pursuant to §2
 - (ii) W percent (w%) to drug and alcohol abuse treatment programs.
 - (iii) X percent (x%) to public education and data collection concerning the health effects of alcohol, tobacco, cannabis, and legal & illegal drugs.
 - (iv) Y percent (y%) to local law enforcement to defray the cost of enforcing provisions of this Act.
 - (v) Z percent (z%) to Social Justice Grants pursuant to §Z of this Act.

§ 2 Sponsored Research Grants Program. A Sponsored Research Grants Program is hereby established for the purposes defined in this Section. The Sponsored Research Grants Program shall be administered by the Department in accordance with this Section.

- (a) The purpose of the Sponsored Research Grants Program is to encourage the development of a Practical Method for detecting and identifying Impairment due to the effects of marijuana.
 - (i) Impairment means the inability of a person to safely drive a motor vehicle, or to safely operate heavy machinery or industrial equipment
 - (ii) A Practical Method is a method that is generally recognized by physicians and/or physiologists as accurate and reliable, can be used in the field by law enforcement officers, and is based on the measurement of chemical or biochemical parameters.
- (b) The Department shall solicit applications for grants under the Sponsored Research Grants Program and shall, by regulation, establish the form and content of such applications, as well as the procedure that the Department shall follow when evaluating applications.
- (c) Every six months, beginning one year after the effective date of this Act, the Department shall make grants substantially equal to the funds then available under §1(b)(i) of this Act, unless the Department determines that no or insufficient applications have

been submitted in conformity with the regulations adopted by the Department pursuant to §2(b) of this Act.

(d) The Department shall evaluate the applications it receives and shall grant each application in whole, in part, or not at all based on the following criteria:

- (i) the likelihood that a grant to the applicant will advance the purpose of the Sponsored Research Grants Program,
- (ii) the funds available,
- (iii) a preference for applicants in the following order:
 - (1) research universities affiliated with this State
 - (2) research universities not affiliated with, but located within this state
 - (3) private entities that propose to conduct within this State the research funded by the grant
 - (4) all others.

(e) Every application made under the Sponsored Research Grants Program shall include an agreement by the applicant to abide by the regulations of the Department, and to grant discounts and licenses under any patent, trade secret or other proprietary right developed in whole or in part using grant funds as follows:

- (i) recipients of grants under the Sponsored Research Grants Program shall grant a royalty free, non-exclusive, sub-licensable license to this State and to all its instrumentalities, sub-divisions, and local governments for the purpose of facilitating the use, in this State, of the results of the grant recipient's work in a Practical Method for detecting and identifying Impairment due to the effects of marijuana.
- (ii) if the State or any of its instrumentalities, sub-divisions, and local governments purchases goods or services that were developed in whole or in part with grant funds from a grant recipient or any licensee, joint venture, partner, successor, or entity controlling or controlled by the grant recipient for use in connection with a Practical Method for detecting and identifying Impairment due to the effects of marijuana, the purchaser shall receive a discount of ten percent (10%) from the average actual selling price for such goods or services to entities other than the State or any of its instrumentalities, sub-divisions, and local governments.