

The Plea Colloquy as Scientific Inquiry: Safeguarding Criminal Defendants Amid Objective Advancements

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ABSTRACT

Across the United States, police officers testify as experts on a wide variety of subjects like blood pattern analysis, fingerprints, and bite marks. Most of these officers qualify as experts by taking a forty-hour training course on a particular subject, usually taught by other officers. These officers then regularly opine on crucial issues at trial; their inclusion as expert witnesses is widely accepted and has led to thousands of wrongful convictions. This relative lack of experience coupled with an ever-changing landscape of actual scientific inquiry renders police testimony on quasi-scientific subjects a dangerous proposition. The system's current safeguards against such unreliable evidence are insufficient to protect criminal defendants, especially the vast majority of whom accept plea agreements to avoid the risk of a trial. Adding a section on scientific reliability to the plea colloquy is a straightforward way to ensure the reliability of evidence over time and accommodate changes to scientific testimony. Trial courts are in the best position to make sure defendants understand the consequences of scientific testimony in their cases, and to protect their rights on appeal. In most jurisdictions, judges are responsible for the drafting of a plea colloquy narrative that occurs on the record in open court; that plea colloquy or a brief proffer should establish a record of scientific accuracy for the evidence presented in that colloquy. The plea colloquy must evolve in this way to safeguard defendants against wrongful convictions rooted in junk science.

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I. THE THREE TRIALS OF ANGELA GARCIA

The fire at 9618 Harvard Ave. began around dinnertime on November 20, 1999. It was the Saturday before Thanksgiving. Next door, Shirley Brandon was on the phone when she heard someone banging on her door. It was her neighbor Angela Garcia, “hollering, help me, help, me[.]”¹

Angela Garcia lived next door to Shirley’s East Cleveland, Ohio, home with her two young daughters, two-year-old Nijah and three-year-old Nyeemah.² While one neighbor called 911, another raced with Angela back to her home as flames ripped through the two story house.³ Firefighters arrived within minutes, but it was too late—both girls died in the master bedroom from smoke inhalation.⁴

The day after the fire, police investigators reviewed the scene and found no evidence of accelerants through the use of a trained dog; they concluded that a burning candle in dining room likely started the fire.⁵ Later, Angela filed an insurance claim for the loss of her home; investigators reviewing that claim believed that she overvalued the home’s contents.⁶ About a month after the fire, the cause was changed from “accidental” to “incendiary,” and Angela was arrested for aggravated murder, manslaughter, and insurance fraud.⁷

¹ Liliana Segura, *The Fire on Harvard Avenue*, THE INTERCEPT (Mar. 5, 2017), <https://theintercept.com/2017/03/05/did-angela-garcia-kill-her-own-daughters-arson-cover-up/> [<https://perma.cc/77SA-ZJ3B>].

² *Guilty Plea Series: The Case of Angela Garcia*, THE INNOCENCE PROJECT (Oct. 23, 2018), <https://innocenceproject.org/news/guilty-plea-series-the-case-of-angela-garcia/> [<https://perma.cc/GL7Z-XLH9>].

³ *Id.*

⁴ Segura, *supra* note 1.

⁵ *Id.*

⁶ *Guilty Plea*, *supra* note 2.

⁷ *Id.* See also *State v. Garcia*, 2002-Ohio-4179, 2002 WL 1874535, at *1 (Ohio Ct. App. Aug. 15, 2002).

Almost like magic, the evidence against Angela changed drastically between the initial investigation and her first trial. The conclusion that no accelerants were used was discarded in favor of one involving “alligatoring,” a char pattern which the investigators now claimed showed evidence of a liquid accelerant.⁸ Even with this “new” evidence, the jury hung, with several jurors believing that Angela loved her children and could not have wanted them harmed.⁹ Angela’s subsequent second trial also resulted in a hung jury when testimony from a jailhouse informant was undermined by the deal the informant got on her own fraud charges.¹⁰

But at Angela’s third trial the game changed yet again. New prosecutors took over and introduced a fresh theory of the crime—the fire had two points of origin, one in the dining room and one on the stairs leading to the second floor.¹¹

The evidence: a never before noticed “burn pattern” visible in a picture taken at the scene. This, prosecutors said, was proof that Garcia had poured a flammable liquid on the staircase, trapping her daughters upstairs before running out of the house.¹²

Where did this new theory come from? Not from forensic analysis of the crime scene, as it had long been destroyed. Not from a chemical analysis of the flooring or from a reenactment of a candle combust—no, this new theory came straight from the informant jailed alongside Angela—Tonya—who had testified at Angela’s second trial. After the woman insisted to police that Angela had confessed, investigators reviewed photographs of the scene that had been in evidence by that point for years.

They discovered a photograph that “revealed unusual burn patterns” on the staircase of the house. One side of the carpet had been totally consumed, showing “heavy charring,” while the other side remained undamaged. There was a marked division between the two areas, [an investigator] wrote—“a clear indication of an ignitable liquid pour pattern.”¹³

In support of this theory, the state had to overcome some significant obstacles, including evidence of already well-established scientific standards. Back in 1992, the National Fire Protection Agency released NFPA 921, or the

⁸ Segura, *supra* note 1. The only real evidence of the point of origin was a candle in the living room, which was alleged to have come in contact with “combustible materials.” *Id.*

⁹ *Id.*

¹⁰ *Id.* The witness, named Tonya, had been recently married to a man named Timothy Lanum. Lanum was known as a “notorious jailhouse snitch,” who had testified against cellmates multiple times. In Angela’s case, both husband and wife had allegedly witnessed confessions from other inmates within three weeks of being incarcerated. Not for nothing, Lanum wrote Angela a letter in 2014 suggesting that she was not in fact guilty of the crime in which his wife testified. Lanum claimed that a detective set the whole thing up, explaining “[y]ou know where [Tonya] got her testimony from? From me, telling her on the phone, ‘This is exactly what you say.’ Whether or not Angela did it or not, it was a fucking travesty. Because it was all made-up bullshit that they wanted on the record.” *Id.*

¹¹ *Id.*

¹² *Id.* See also Garcia, 2002 WL 1874535, at *3.

¹³ Segura, *supra* note 1.

Guide for Fire and Explosion Investigations, the “single most important treatise ever published” in the field.¹⁴ The guide “revolutionized arson analysis,” and required the use of the scientific method in order to establish causation.¹⁵ “Among the tools eliminated by the guide were go-to visual signs like the alligatoring [the state] pointed out to Garcia’s jury. Today, alligatoring is a long-discarded myth; NFPA 921 warns sternly against using it as proof that an accelerant has been used to start a fire.”¹⁶

Not only did the new testimony disregard this standard, the state also called a new expert who “insisted that he could tell through visual analysis alone that the fire had been caused by a liquid accelerant” and overtly rejected the use of the NFPA’s standards.¹⁷ “You are asking me if I can look at this pattern and say to myself that’s a liquid pour pattern,” he said on cross-examination. “Yes, I can say that. I don’t care what the NFPA says.”¹⁸ Despite her own expert, who had not testified in her other trials and who disputed the state’s evidence, Angela was convicted in May of 2001 and sentenced to life in prison.¹⁹

“As with many arson cases that have come under scrutiny in recent years, the evidence against Garcia was flawed—based on circumstantial evidence, a flimsy fire investigation, and junk science.”²⁰ Much of the flawed evidence in her case and in others centers on those “burn patterns,” or visual imagery at the scene of a fire that officers believe is proof of a flammable liquid poured over a floor or furniture.²¹ The issue with burn pattern analysis is that it has long been specifically discredited in the scientific community—and at a crucial juncture in Angela’s case, both the prosecutors who tried Angela and the investigators who testified against her knew it.²² After a decade in prison, Angela moved the court for a new evidentiary hearing arguing that advances in fire science should be ruled “new evidence” to allow her a new trial.²³ This motion was based on a report that “exposed the lack of scientific validity behind Garcia’s conviction, pointing to accidental scenarios that were never explored, along with recent scientific studies that [had] further undermined the state’s case.”²⁴

Just before the hearing on Angela’s motion, both of the prosecutors attended a course on the proper investigation of fires.²⁵ This training focused on minimum qualifications for investigators, the scientific method, and

¹⁴ *Id.* See generally NAT’L FIRE PROT. ASS’N, NFPA 921: GUIDE FOR FIRE AND EXPLOSION INVESTIGATIONS (1992).

¹⁵ Segura, *supra* note 1.

¹⁶ *Id.*; NAT’L FIRE PROT. ASS’N, NFPA 921: GUIDE FOR FIRE AND EXPLOSION INVESTIGATIONS (2024).

¹⁷ Segura, *supra* note 1.

¹⁸ *Id.*

¹⁹ *Id.*

²⁰ *Id.* With no laboratory testing to back up the images, [an investigator] argued that the state’s conclusions were “the equivalent of walking into a drug case and having the officer looking at a picture of a white substance and saying, geez, that looks like crack cocaine, it must be.” *Id.*

²¹ *Id.*

²² *Id.*

²³ *Id.*

²⁴ *Id.*

²⁵ *Id.*

instructions on how to properly determine origin and cause.²⁶ The presentations at this course would have, by definition, contradicted the theories that the state had relied on to convict Angela at her third trial.²⁷ Nevertheless, a month and a half after the course concluded, the state filed to continue Angela's evidentiary hearing to have an independent consultant write a report that would contradict virtually every aspect of what the prosecutors had just learned.²⁸

After two hung juries, vacillating theories of guilt, and more than a decade in prison, Angela's case was poised to finally overcome the shoddy investigative work that condemned her—until she was made a proposal; instead of going through with the hearing that might have exposed the complete lack of scientific certainty in her conviction, Angela was offered a plea that would allow her to trade in her life sentence for one that would let her out within six years.²⁹ She took it, even as two distinguished fire scientists, one of whom flew in on his own dime, stood ready to testify that she was factually innocent of setting the fire that killed her babies.³⁰ But who could blame her; even as she sobbed through the plea colloquy, it gave her hope that one day she would walk free and be able to visit the graves of her beloved children.

Offers like the one Angela received are the backbone of the criminal justice system; the vast majority of all criminal cases end in a guilty plea, with some studies showing that close to ninety-seven percent of cases do not see a trial.³¹ With such a significant number of criminal charges ending in pleas, certainly some end up being influenced by scientific evidence later proven inaccurate, especially with the number of police officers who testify as experts in quasi-scientific fields. And because so many cases plead, very little of this police-established evidence ever becomes subject to an evidentiary hearing. Few criminal defendants who plead guilty ever get to relitigate their guilt—once they have pled, the strength of the evidence against them is no longer legally relevant. Of course, there are a few relevant mechanisms like actual innocence statutes and clemency,³² but these options are nearly toothless. The strength of evidence against a defendant should always matter—even years after they plead guilty to the charges. When defendants cannot question the scientific accuracy of things like arson investigations, injustice results when it is later discovered that their plea was based on junk science established by police witnesses with little to no actual scientific training.

A plea must be both knowingly and voluntarily made,³³ and as such, is necessarily based on and influenced by the scientific evidence reviewed by defense counsel. Requiring a scientific proffer at a plea colloquy would

²⁶ *Id.*

²⁷ *Id.*

²⁸ *Id.*

²⁹ *Id.*

³⁰ *Id.*

³¹ DAN CANON, *PLEADING OUT: HOW PLEA BARGAINING CREATES A PERMANENT CRIMINAL CLASS* 7 (2022).

³² See Section V, *infra*, for a discussion of some current options for scientific review, including actual innocence statutes.

³³ See, e.g., FED. R. CRIM. P. 11.

protect both the rights of a criminal defendant and the needs of the system by allowing a safety valve for review when the strength of the evidence changes. Should evidence later be viewed as inaccurate, a thorough plea colloquy including the scientific basis for the state's evidence strengthens both the case against the defendant and his plea—and it does so without having to appropriate funds, make its way through a state legislature, or be signed into law by an executive. All the solution needs is an amenable judge and a pre-written form for potentially wide-ranging benefits.

II. THE SYSTEMIC PROBLEM WITH POLICE EXPERTS

Cases like Angela's are not rarities; "[i]n the time since Garcia went to prison, more than 50 people have been exonerated in arson cases across the country, with many more convictions overturned."³⁴ Many of these exonerations are based on quasi-scientific evidence admitted through the testimony of poorly trained officers. While arson is a particularly fruitful source of this such wrongful convictions, examples of the insufficient education of police abound in many contexts, starting with the basic legal training for officers—the police academy. Yuri Linetsky describes the exact training that most police academies provide, and opines that it is insufficient, even in terms of how much officers know when they try to enforce the law.³⁵ Linetsky, a professor and a police officer himself, describes what he calls an inadequate amount of training, even for a police officer who is *not* acting as an expert witness:

An empirical analysis of training requirements in state police academies shows that the number of hours devoted to legal topics is, on average, surprisingly low: about 12% of total academy hours. Most academies devote many of those hours to the state's statutory and traffic laws, rather than to teaching legal theory, application, and limitations of the law.³⁶

Linetsky details the problem with officers, who have significant power over Americans, as one that derives from a lack of real education and training. While criminal justice programs across the country dispense even doctoral degrees, none is required for officers, who instead take a training program at a state-sponsored academy.³⁷ Most academies take less than six months to complete—some are as short as three.³⁸ The academies devote little time

³⁴ Segura, *supra* note 1.

³⁵ See generally Yuri R. Linetsky, *What the Police Don't Know May Hurt Us: An Argument for Enhanced Legal Training of Police Officers*, 48 N.M. L. REV. 1 (2018).

³⁶ *Id.* at 3.

³⁷ *Id.* at 16–19.

³⁸ *Id.* For example, in Indiana, the Indiana Law Enforcement Agency (ILEA) runs the statewide police academy, which takes 600 hours, or fifteen weeks, to complete. *Basic Training - Tier I*, IND. L. ENF'T ACAD. <https://www.in.gov/ilea/about-the-academy/basic-training-tier-i/> [<https://perma.cc/C6Z9-638H>] (last accessed Sep. 22, 2025). Police academy is roughly 800 hours in Kentucky. *Law Enforcement Basic Training*, DEPT. OF CRIM. JUST. TRAINING, <https://www.docjt.ky.gov/basic> [<https://perma.cc/E5VM-ZSQJ>] (last accessed Sep. 22, 2025), and as much as six months in New York, *Training & Physical Requirements*, NYPD RECRUITMENT,

to learning the law yet expect officers to enforce it fairly. As such, Linetsky describes multiple cases in which civilians were arrested on disorderly conduct or domestic violence charges for clearly constitutional speech.³⁹ In each case, the officer reviewed and attempted to enforce the text of a state statute but was unaware that courts had already determined that the speech in question was constitutionally protected.⁴⁰

These kinds of cases, while unfortunate, are easily remedied by dismissing charges or by increasing the kinds of police training that already exist. But the inexperience and inaccuracies of police training are not limited to applications of the law. Linetsky's argument is even stronger when made in reference to police officers who testify as experts in quasi-scientific areas. For instance:

David Camm lost 13 years of his life to eight drops of blood. In 2000, the Indiana state trooper was charged with murder after finding his wife and two children shot to death in their home. During the three trials that followed, the prosecution brought in bloodstain experts who argued that the flecks of blood on the t-shirt Camm had worn the night of the murder were “high-velocity impact spatter”—proof, they said, that he was the shooter.⁴¹

Camm was convicted twice; courts overturned both convictions.⁴² At his third trial, a forensic scientist testified that there was “too little information [relative to the bloodstains] from which to draw any meaningful conclusion.”⁴³ He was acquitted in his third trial, after another man had been convicted of the crime in a separate proceeding.⁴⁴ Unlike Camm's, that man's DNA was found at the crime scene years prior under one of the victim's fingernails.⁴⁵

Typically, an officer who testifies to crucial evidence like the bloodstain analysis in Camm's case has completed no more than a forty-hour training course in his discipline,⁴⁶ and he rarely has even an associate's degree in the field as the only required education is the academy. By contrast, the expert scientists who discredit their testimony are typically highly educated in

<https://nypdrecruit.com/pages/police-officer-training-physical-requirements> [<https://perma.cc/7KA3-AS2D>] (last accessed Sep. 22, 2025).

³⁹ Linetsky, *supra* note 36, at 2–15.

⁴⁰ *Id.*

⁴¹ Katherine J. Wu, *There will Be Blood, and Physics, Too: The Messy Science of Bloodstain Pattern Analysis*, NOVA (Aug. 6, 2019), <https://www.pbs.org/wgbh/nova/article/forensics-bloodstain-pattern-analysis/> [<https://perma.cc/R9HP-Q3DN>]. See also David Camm, THE NAT'L REGISTRY OF EXONERATIONS, <https://exonerationregistry.org/cases/11440> [<https://perma.cc/HG3S-93Y8>] (last updated Aug. 24, 2023).

⁴² D.R.C. v. State, 908 N.E.2d 215, 219–21 (Ind. 2009).

⁴³ Pamela Coloff, *Bloodstain Analysis Convinced a Jury She Stabbed Her 10-Year-Old Son. Now, Even Freedom Can't Give Her Back Her Life*, PROPUBLICA (Dec. 20, 2018), <https://www.propublica.org/article/bloodstain-pattern-analysis-jury-wrongful-conviction-acquitted-exonerated> [<https://perma.cc/3J2J-9NZH>].

⁴⁴ Wu, *supra* note 41.

⁴⁵ *Id.*

⁴⁶ Linetsky, *supra* note 35. See also A.C. Thompson, Rohan Naik & Ken Schewencke, *Hate Crime Training for Police Is Often Inadequate, Sometimes Nonexistent*, PROPUBLICA (Nov. 29, 2017), <https://www.propublica.org/article/hate-crime-training-for-police-is-often-inadequate-sometimes-nonexistent> [<https://perma.cc/E45E-BGRT>].

analytical sciences with experience in empirical research.⁴⁷ These cases underscore a troubling trend in American jurisprudence: that police officers testify routinely as experts on all kinds of high profile trial matters, like blood pattern analysis and the origin of building fires, with little relevant scientific training. And defendants like Angela Garcia end up spending the rest of their lives in jail based on their opinion testimony.

Up until now, there has been little to no judicial pushback on officers who testify to specious science. Some jurisdictions have reviewed the issue of scientific testimony in criminal cases; they now differentiate between scientific and other training, both in their case law and in their rules of evidence, but to little avail. New Mexico, for instance, has set forth separate standards for “scientific” and “specialized” fields of testimony.⁴⁸ For example, *State v. Torrez* examined a murder trial in which the defense objected to a police officer offered as an expert in “gang-related law enforcement and gang culture.”⁴⁹ New Mexico Evidence Rule 11-702, on the testimony of expert witnesses, requires that the testimony assist the trier of fact and be based on “scientific, technical or other specialized knowledge.”⁵⁰ In *Torrez*, the defendant argued that the officer’s testimony “amounted to ‘junk science’ and an unscientific attempt to predict the behavior of gang members.”⁵¹ Further, the methodology could not be tested, as “gang culture” is not a recognized field of study.⁵² In allowing the officer’s testimony under Rule 11-702, the court drew a distinction between two words in the rule and opined that the defendant confused “the standards applicable to determining the admissibility of expert *scientific* testimony with those for admitting expert testimony based on the *specialized knowledge* of the expert witness.”⁵³ For the New Mexico Supreme Court, the officer was an expert in the *specialized* field of gang culture, not the *scientific* field, thus, the officer’s limited training was still enough to qualify him as an expert.⁵⁴

But evidence rules like these, even when they attempt to refine how we admit evidence, rarely discourage judges from accepting the pseudo-scientific expert testimony of a police officer. While the evidentiary distinction might be helpful in cases involving obvious scientific testimony, like when a medical examiner determines a cause of death or when a doctor opines on how permanent a disability might be, it is less clearly applicable to those fields that are science-adjacent.⁵⁵ In addition to the scientific/specialized analysis

⁴⁷ See, e.g., Pierre Margot, *Commentary on The Need for a Research Culture in the Forensic Sciences*, 58 UCLA L. Rev. 795 (2011).

⁴⁸ *State v. Torrez*, 210 P.3d 228, 234–36 (2009).

⁴⁹ *Id.* at 231.

⁵⁰ Rule 11-702 N.M.R.A.

⁵¹ *Torrez*, 210 P.3d at 234.

⁵² *Id.* at 233.

⁵³ *Id.* at 234.

⁵⁴ *Id.*

⁵⁵ Police officers testify to all manner of evidence, such as identifications, confessions, and the investigative steps they take. It is in the more highly technical fields, such as fingerprinting and ballistics, where scientific experts can be more accurate than police officers in their opinions. This article focuses on these “science adjacent” fields to the exclusion of other realms of erroneous evidence.

in *Torrez*, New Mexico courts have reviewed police expert credentialing in a blood pattern analysis case under Rule 11-702. *State v. Fry* involved a homicide where the defense objected to the state's blood spatter analyst on the grounds that the officer was not an expert.⁵⁶ The court upheld the admission of his testimony on the grounds that blood spatter evidence was subject to peer review, was testable, and that the theory had been generally accepted in the field.⁵⁷ The main witness: the blood spatter expert officer himself, who was essentially self-proving his own expertise.⁵⁸

In *Fry*, as in a large body of cases,⁵⁹ courts uphold the testimony of police officers as experts in these scientific-adjacent fields. While the *Fry* court held that the blood spatter evidence was scientific instead of specialized under the statute, it did not require the testimony of a scientist, or even someone with more than forty hours of training, to admit it. By far, the most common expert witness at any criminal trial is a police officer, and they are tasked with providing evidence against thousands of criminal defendants every year. It is in these "scientific cases presented by non-scientists" where we see many wrongful convictions, and where the court should be proactive in protecting future defendants.

A. The History of Scrutinizing the Police as Quasi-Scientific Experts

The use of police officers as expert witnesses in American criminal trials has been commonplace for decades. As early as the 1950s, trial judges "welcomed police officers as expert witnesses on crime, including on topics previously deemed either commonsensical or the province of scientific professionals."⁶⁰ The commonality of such testimony evolved into a significant amount of deference, both from juries and from judges.⁶¹

Over time, this expert testimony has come under some scrutiny—leading in part to the creation of a landmark report commissioned by Congress in 2009. This report,⁶² released by the National Academy of Science (NAS), has served as the foundation for much of the creation and admission of forensic testimony in courts nationwide. Written nearly half a century after the advent of police as experts, it was created in response to the "notable dearth of peer-reviewed, published studies establishing the scientific bases and validity of

⁵⁶ *State v. Fry*, 126 P.3d 516, 540 (2005). In *Fry*, the court discussed that the expert in question had testified over 300 times and had qualified as an expert in twenty-five jurisdictions, but there was no mention of their formal scientific training beyond a police-based course; thus, the court's opinion did not require formal scientific training, like a degree, as a requirement to admission.

⁵⁷ *Id.* at 540–42.

⁵⁸ *Id.*

⁵⁹ See Paul C. Giannelli, *Scientific Evidence in Civil and Criminal Cases*, 33 ARIZ. ST. L. J. 103, 112–17 (2001).

⁶⁰ Anna Lvovsky, *The Judicial Presumption of Police Expertise*, 130 HARV. L. REV. 1995, 2000 (2017).

⁶¹ See, e.g., *Terry v. Ohio*, 392 U.S. 1, 27 (1968) (urging courts to give weight to inferences drawn by officers "in light of [their] experience").

⁶² NAT'L ACAD. OF SCIS., STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD (2009).

many forensic methods.”⁶³ Notably, the report’s drafters heard consistent testimony that the entire system has “serious problems that can only be addressed by a national commitment to overhaul the current structure that supports the forensic science community in this country.”⁶⁴ The NAS’s ultimate recommendations “included the establishment of a wholly independent federal agency to oversee the forensic science community,” the need for certification and accreditation of forensic science professionals, and “the need for institutional independence of public forensic laboratories, which the NAS found often hold a prosecutorial bias.”⁶⁵

The 2009 NAS report, among others, defined the problem as one so fundamental to the system as to render it broken and in need of structural reform.⁶⁶ Nevertheless, the study barely moved the needle in terms of improving the accuracy of such testimony in criminal trials. While the National Association of Criminal Defense Lawyers notes that the issue was so significant as to be the “second leading cause of wrongful convictions [in America] . . . much of the promise of the 2009 NAS report and its associated recommendations remain unfulfilled[.]”⁶⁷ In 2017, the Department of Justice disbanded the National Commission on Forensic Science, and “ended plans for an expanded review of FBI testimony in several forensic disciplines . . . leaving open the possibility that similar errors and resulting wrongful conviction will go unremedied.”⁶⁸

In light of such scrutiny, jurisdictions have reviewed several different police techniques that are scientific or quasi-scientific in nature; many techniques that were once regularly utilized in court are no longer viewed by the justice system as valid since the empirical basis for them has disintegrated over time. Journalists call these outdated techniques “junk science,” and argue that they have “wormed their way into every corner of our real-life criminal justice system” as they have been instrumental in thousands of convictions.⁶⁹ Thankfully, some techniques have gone the way of the dinosaurs,⁷⁰ even if they are responsible for convicting some of our country’s arguably most dangerous men. Bite mark analysis, for example, was once used to convict infamous serial killer Ted Bundy and became widely used in a variety of subsequent criminal prosecutions. In *Forensic Odontology and Bite Mark Analysis: Understanding the Debate*, Anthony Cardoza explains that Bundy’s case “put bite marks as evidence on

⁶³ *Id.* at 8. See also *Ten Years Later: The Lasting Impact of the 2009 NAS Report*, THE INNOCENCE PROJECT, (Feb. 19, 2019), <https://innocenceproject.org/news/lasting-impact-of-2009-nas-report/> [<https://perma.cc/PGY2-AFP3>].

⁶⁴ NAT’L ACAD. OF SCIS., *supra* note 62, at xx.

⁶⁵ *News Release: The NAS Report on Strengthening Forensic Science, Ten Years On; Much Work Still to be Done*, NAT’L ASS’N OF CRIM. DEF. LAWS. (Feb. 18, 2019), <https://www.nacdl.org/newsrelease/News-Release--02-18-2019> [<https://perma.cc/MAN6-PCK3>].

⁶⁶ *Id.*

⁶⁷ *Id.*

⁶⁸ *Id.*

⁶⁹ Sophia Kovatch, Pamela Colloff & Brett Murphy, *Is it Forensics, or Is It Junk Science?*, PROPUBLICA, (January 31, 2023), <https://www.propublica.org/article/understanding-junk-science-forensics-criminal-justice> [<https://perma.cc/FM4X-6TVL>].

⁷⁰ At the time of writing, it was widely reported in the media that scientists had recently cloned a previously extinct animal called a dire wolf. While the potential for resurrecting the T-Rex might at some time exist, it is not yet a viable technique supported by empirical studies.

the map,” and that such analysis “went ‘viral’” after his conviction through the next twenty-five years.⁷¹ However, starting in the 2000s, “it started to become evident to some odontologists that the opinions of bite mark patterns and bite mark analysis were not consistent between ‘experts.’”⁷² Because Bundy later confessed to killing 30 women between 1974 and 1978, his case was not one where most would argue his actual innocence based on bad scientific testimony—nevertheless, it was influenced significantly by science that is no longer widely accepted. The forensic odontologist who testified at Bundy’s trial, Richard Souviron, even “recently said his bitemark testimony would have been different after 30 additional years working in that field.”⁷³

Cardoza’s take on how the intersection between science and policing can obscure the truth could not be clearer. He, a dentist and not a police officer, describes what many lawyers never seem to fight: the wholesale acceptance of scientific or quasi-scientific testimony established in court by police officers alone when there is no real basis for the opinions. He describes the massive proliferation of bite mark testimony in hundreds of cases, but “[e]ven though reliability and validity of bite mark analysis had not been established, bite mark testimony continued to be accepted by the courts.”⁷⁴ The passage of time has been rough on other police-established fields like hypnosis and 911 call analysis, and these two equally problematic fields illustrate that this problem is one exacerbated if not created by law enforcement.

From the 1950s through the 1980s, hypnosis became a popular tool for law enforcement use.⁷⁵ Considered a reliable “way to exhume information thought to be buried in the mind,” hypnosis is defined as a “highly suggestible state into which a willing subject is induced by a skilled therapist” to recall memories of a crime they had been a victim of or a witness to.⁷⁶ Prior to 1979, virtually all jurisdictions which addressed the subject of hypnosis held that it was a permissible means of refreshing the recollection of a witness.⁷⁷ Since then, however, jurisdictions across the country have struggled with whether or not the technique is scientifically sound, and it has largely fallen out of favor.

The use of hypnosis in criminal cases illustrates that a significant part of the problem with changing evidence lies in law enforcement motivations to utilize it. Much like other police-driven pseudoscience, the appeal of the technique lies in its ease of use and inexpensiveness, thus becoming an attractive evidentiary option for offices that chronically operate on small budgets.

⁷¹ Anthony Cardoza, *Forensic Odontology and Bite Mark Analysis: Understanding the Debate*, 51 J. CAL. DENTAL ASS’N 1 (2023) [<https://doi.org/10.1080/19424396.2023.2210332>].

⁷² *Id.*

⁷³ Laurie Kaiser, *Bitemark Evidence Can Send Wrong Person to Prison, Death Row, UB Professors Say*, UBNOW (July 26, 2023), <https://www.buffalo.edu/ubnow/stories/2023/07/bush-bitemark-evidence.html> [<https://perma.cc/QWD2-2JCW>].

⁷⁴ Cardoza, *Forensic Odontology*, *supra* note 71, at 1.

⁷⁵ Alison Winter, *The Rise and Fall of Forensic Hypnosis*, 44 STUD. IN HIST. & PHIL. BIOLOGICAL & BIOMEDICAL SCI. 26, 27.

⁷⁶ *State v. Mack*, 292 N.W.2d 764, 765 (Minn. 1980) (citing J. COLEMAN, ABNORMAL PSYCHOLOGY AND MODERN LIFE 579 (2d ed. 1960)).

⁷⁷ 3A CIPES, BERNSTEIN & HALL, CRIMINAL DEFENSE TECHNIQUES § 68A.03 (Matthew Bender, Rev. Ed.) (2025).

This is largely due to the training requirements which—as in many other police “expert” fields—is minimal at best. Ira Mickenberg explains that:

The use of hypnotism is a somewhat common prosecution tactic in cases where a government witness is unable to remember key details of a crime. Moreover, these cases are no longer limited to large cities in which the prosecutor’s office has the resources to engage in hypnosis. A small but thriving industry has grown up in which weekend seminars have been conducted to train police officers as instant “experts” on hypnosis. These officers then return home and begin hypnotizing crime victims and witnesses. Consequently, hypnosis is used in both large cities and smaller communities.⁷⁸

For example, for the low price of \$70.50 (on sale from \$150.00), one can obtain a certificate in forensic hypnosis from the Mottin & Johnson Institute of Hypnosis.⁷⁹ The program’s founder, Don Mottin, joined the police force after a stint in the Marines.⁸⁰ Within four years, he quit police work and opened his own Institute of Hypnosis, teaching other officers to use the techniques he learned during a year spent studying them in Japan.⁸¹ This was not before he “used hypnosis to help the police with cases involving murder, rape, kidnapping, robberies, burglaries, and other major crimes.”⁸² Mottin describes himself as “one of the foremost experts in hypnosis today.”⁸³

In terms of value to potential clients, Mottin bills his day-long course as a chance to “take your hypnosis practice into the exciting field of Forensic hypnosis,” advertising that “[h]ypnosis has been used to help solve crimes as far back as 1845. Police Departments have found that even in States [sic] not allowing hypnosis to be used in court, it is a very valuable adjunct to their investigations. This exciting program will also prove to be extremely valuable in helping you establish regression techniques that are both beneficial and accurate for your clients.”⁸⁴

If Mr. Mottin’s course isn’t appealing, perhaps one from the Texas Commission on Law Enforcement might fit the bill.⁸⁵ In Basic Investigative

⁷⁸ *Id.*

⁷⁹ *Forensic Hypnosis*, MOTTIN & JOHNSON INST. OF HYPNOSIS, <https://donmottin.com/home/shop/programs-with-certificates/forensic-hypnosis-digital-view-download/> [https://perma.cc/NZZ4-NL2V]. The full package includes four DVDs, a workbook, and a certificate of completion and takes “one full day” to complete. *Id.*

⁸⁰ *Meet Don Mottin*, MOTTIN & JOHNSON INST. OF HYPNOSIS, [https://donmottin.com/\[https://perma.cc/5NCT-XFC3\]](https://donmottin.com/[https://perma.cc/5NCT-XFC3]).

⁸¹ *Id.*

⁸² *Id.*

⁸³ *Id.* Mottin’s website brags: “every major hypnosis organization has presented Don with awards for his unique teaching abilities. Don is the only hypnosis instructor in the country that has been named Instructor of the Year by NGH three times. Other awards include: the Rexford L. North Trophy, the President’s Award, Educator of the Year, the prestigious Ormond McGill Award, the Iron Man Of Hypnosis Award, and the Charles Tebbett’s Award just to name a few. Don has also been featured on the cover of the Journal of Hypnotism. Mottin loves teaching hypnosis and he does it very well. Going to Google and typing in Don Mottin will generate hundreds of responses from those who have trained with Don.” *Id.*

⁸⁴ *Forensic Hypnosis*, *supra* note 79.

⁸⁵ The state of Texas has not cornered the market on police pseudoscience. Mottin and other trainers operate across the country, using web-based videos that can be accessed with just

Hypnosis, “[s]tudents will learn about the role of the police investigative hypnotist, the ethical and professional aspects of hypnosis, and proper interviewing techniques” as well as “hypnosis techniques such as induction techniques, deepening techniques, and the use of the Chevreul pendulum.”⁸⁶ The course takes a minimum of forty hours to complete, and includes classroom, practical and field exercise hours.⁸⁷ It may be taught by a fellow police officer who has themselves taken the course.⁸⁸

Neither Mottin nor the officers at the Texas Commission on Law Enforcement have a background in science; nevertheless, not only do they advocate for and testify to the efficacy of this technique, but they create and run the programs that train police officer experts nationwide. Yet, the current state of the law largely does not support the use of the technique in court, and much of the precedent surrounding its exclusion is based on a lack of scientific rigor. Mickenberg discusses four separate approaches states have used to restrict or abolish the use of hypnotized witness testimony.⁸⁹ A limited number of jurisdictions do apply *Daubert* and some have consequently excluded testimony.⁹⁰ In *Borawick v. Shay* the Second Circuit reviewed the appropriate standard for the introduction of hypnotized testimony.⁹¹ There, an alleged victim of sexual abuse sued her aunt and uncle in tort.⁹² The victim had no memory of any abuse for twenty years until she began experiencing panic attacks in her late twenties.⁹³ After a significant amount of treatment,

an internet connection and an iPhone. Further, the federal government has also used hypnosis in law enforcement, despite also publishing articles on the unreliable nature of the practice as long ago as 1979. In the journal *Detective*, one author opines that hypnosis should only be used as a last resort in criminal investigations due to legal and mental health considerations. G.L. Griffiths, *Investigative and Forensic Hypnosis*, DETECTIVE, Summer 1979, at 14, 19, <https://www.ojp.gov/ncjrs/virtual-library/abstracts/investigative-and-forensic-hypnosis> [<https://perma.cc/7X9E-UBY8>].

⁸⁶ TEX. COMM’N ON L. ENF’T, *Basic Investigative Hypnosis: Instructor Resource Guide* (2025), <https://www.tcole.texas.gov/document/basic-investigative-hypnosis.pdf> [<https://perma.cc/JDE5-DYVT>].

⁸⁷ *Id.*

⁸⁸ *See id.*

⁸⁹ 3A CIPES, BERNSTEIN & HALL, *supra* note 77, § 68A.03. Mickenberg also goes on to discuss the evidentiary rules states have enacted to deal with the technique. *Id.*

⁹⁰ *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579 (1993). *Daubert* sets the standard for the introduction of scientific evidence, holding that a technique upon which an expert opinion was based did not have to be generally accepted as reliable as a precondition to the opinion’s admission as long as the standards of reliability and relevance under the federal evidence rules were met. *Id.* at 597–98. This was a relaxation of previous standards for the admissibility of scientific evidence based on *Frye v. United States*, which had previously held that expert opinion based on a scientific technique is inadmissible unless the technique is generally accepted as reliable in the relevant scientific community. *See* 293 F. 1013 (D.C. Cir. 1923). As *Daubert* relaxed the *Frye* requirement of general acceptance, Mickenberg opined that “[i]t is likely that as states choose to adopt the *Daubert* standard, they will decide that hypnosis meets the standards for the introduction of scientific evidence.” 3A CIPES, BERNSTEIN & HALL, *supra* note 77, § 68A.03. However, this has not panned out, and several cases applying the *Daubert* standard have ruled hypnotized testimony inadmissible. *See* *United States v. D.W.B.*, 74 M.J. 630, 638 (N-M. Ct. Crim App. 2015) (“Many jurisdictions hold that hypnosis as a general matter fails a *Daubert* (or, in older cases, *Frye*) reliability analysis, and accordingly, witnesses are per se barred from testifying to memories recovered during or after hypnosis.”).

⁹¹ *Borawick v. Shay*, 68 F.3d 597 (2d Cir. 1995).

⁹² *Id.* at 598.

⁹³ *Id.*

the victim underwent hypnosis that “uncovered” memories of abuse.⁹⁴ There, the Second Circuit applied a seven-factor case-by-case analysis, focusing on the purpose of the hypnosis, the suggestibility of the subject, and the presence of a video or audio recording of the hypnosis session.⁹⁵ The court further suggested that a pretrial hearing on the reliability of hypnotized evidence would be “highly desirable.”⁹⁶

The court also specifically referenced *Daubert* in choosing this more strenuous test to apply, even though the fundamental question was not the admissibility of an expert witness, but of a lay one; Borawick was the complaining witness, not the hypnotist. Nevertheless, the court detailed that “[e]ven though *Daubert* does not provide direct guidance, our decision today is informed by the principles underlying the Supreme Court’s holding.”⁹⁷ After applying the extensive and *Daubert*-adjacent test, the Second Circuit excluded Borawick’s testimony, largely based on her hypnotist’s lack of scientific qualifications and his lax use of techniques, such as not keeping notes of sessions.⁹⁸ Combined with the “inherent incredibility” of her “far-fetched, uncorroborated” allegations, the court held that the entirety of the witness’s testimony

⁹⁴ *Id.* at 598–600. The opinion goes into extensive detail relative to the “uncovering” of these memories. Her panic attacks started in 1984, and she underwent hypnosis starting in 1987. *Id.* at 598. She revealed sadistic if not inconceivable abuse during the sessions, but did not independently remember any abuse until 1989. *Id.* at 598–99.

⁹⁵ *Id.* at 608.

⁹⁶ *Id.* (“First, it should evaluate the purpose of the hypnosis: whether it was to refresh a witness’s memory of an accident or crime or whether it was conducted as part of therapy . . . a second important consideration is whether the witness received any suggestions from the hypnotist or others prior to or during hypnosis such as a theory of the cause of the subject’s ailments or key information relevant to the investigation for which she underwent hypnosis. A third and related factor is the presence or absence of a permanent record, which can help the court ascertain whether suggestive procedures were used. Ideally, the session should be videotaped or audiotaped. Fourth, a court should consider whether the hypnotist was appropriately qualified by training in psychology or psychiatry. A fifth factor is whether corroborating evidence exists to support the reliability of the hypnotically-refreshed memories. Sixth, evidence of the subject’s hypnotizability may also be relevant. A highly hypnotizable subject may be more prone to confabulate and more susceptible to suggestion. Seventh, the court should consider any expert evidence offered by the parties as to the reliability of the procedures used in the case. Finally, a pretrial evidentiary hearing is highly desirable to enable the parties to present expert evidence and to test credibility through cross-examination.”).

⁹⁷ *Id.* at 610 (“Even though *Daubert* does not provide direct guidance, our decision today is informed by the principles underlying the Supreme Court’s holding. First, by loosening the strictures on scientific evidence set by *Frye*, *Daubert* reinforces the idea that there should be a presumption of admissibility of evidence. Second, it emphasizes the need for flexibility in assessing whether evidence is admissible. Rather than using rigid “safeguards” for determining whether testimony should be admitted, the Court’s approach is to permit the trial judge to weigh the various considerations pertinent to the issue in question. Third, *Daubert* allows for the admissibility of scientific evidence, even if not generally accepted in the relevant scientific community, provided its reliability has independent support. Finally, the Court expressed its faith in the power of the adversary system to test ‘shaky but admissible’ evidence, and advanced a bias in favor of admitting evidence short of that solidly and indisputably proven to be reliable. Finally, we note that, even if *Daubert* were of direct application, nothing in *Daubert* is inconsistent with our outlined approach.”) (citations omitted).

⁹⁸ See *id.* at 609 (“The district court’s finding that St. Regis was not properly qualified finds ample support in the record: his formal education ended with a high school diploma; he had no formal training in psychiatry or psychotherapy; his hypnotic technique used an experimental cranial electronic stimulator; he did not read the professional literature; and his work experience prior to being a hypnotist at Pacific Medical Center was intermittent.”).

was inadmissible.⁹⁹ They felt so strongly in their opinion that they refused to remand the case to the lower court for further review, choosing instead to dismiss it outright.¹⁰⁰

In some states, like California, courts have held that hypnotizing a witness *per se* renders their testimony inadmissible. In *People v. Shirley*,¹⁰¹ the California Supreme Court discussed just how unreliable the courts in that jurisdiction view hypnosis. There, in a rape case in which the complaining witness had been hypnotized to enhance her testimony,¹⁰² the trial court had ruled that hypnosis goes only to the weight of the evidence, and not the admissibility.¹⁰³ On appeal, the court examined cases from across the country where the testimony of witnesses who had been hypnotized was “unanimously” excluded, and stated they joined “a growing number of courts that have abandoned any pretense of devising workable ‘safeguards’ and have simply held that hypnotically induced testimony is so widely viewed as unreliable that it is inadmissible under the *Frye* test.”¹⁰⁴ Thus, “[i]n accord with recent and persuasive case law and the overwhelming consensus of expert opinion, [the court concluded] that the testimony of such a witness should not be admitted in the courts of California.”¹⁰⁵

But in most jurisdictions, hypnotically enhanced testimony is not excluded *per se*; rather, a witness who has been hypnotized may only testify to memories that existed before the hypnosis. Those that appeared only because of the hypnosis are inadmissible and excluded.¹⁰⁶ Twenty-two jurisdictions use this majority rule, and many others either highly scrutinize the exercise of hypnosis or bar all hypnotized testimony on a *per se* basis.¹⁰⁷ As such, the use of hypnosis in modern trial work is virtually non-existent, and it remains a remnant of discredited pseudoscience.

⁹⁹ *Id.* at 609.

¹⁰⁰ *See id.* (“Since in our view the factors before the district court weighed decisively against the admissibility of Borawick’s testimony, we are convinced that if the district court had followed our test, it would have necessarily reached the same conclusion. We see no point in remanding the case so that the district court can reach the same finding.”); *see also* 3A CIPES, BERNSTEIN & HALL, *supra* note 77, § 68A.03.

¹⁰¹ 723 P.2d 1354 (1982).

¹⁰² *See id.* In *Shirley*, there was an indication that the testimony elicited at trial did not exist before the hypnosis. *Id.* at 1359–61. The complaining witness “was allowed to testify to a number of matters that she assertedly had been unable to recall on two occasions prior to hypnosis, i.e., when she gave statements to the police on the night of the events in question, and when she testified at the preliminary hearing.” *Id.* This evidence included details of the removal of her clothing, the use of a knife, as well as an incident of oral copulation. *Id.*

¹⁰³ This argument has been advanced in a few other jurisdictions. Based on pre-*Daubert* cases, it is a minority position. *See, e.g.,* *Harker v. State*, 463 A.2d 288 (Md. App 1983) (“A number of jurisdictions similarly ruled that pretrial hypnotism raises questions as to the weight and credibility, rather than the admissibility, of the evidence.”) (citing *United States v. Adams*, 581 F.2d 193, 198 (9th Cir. 1978); *United States v. Narciso*, 446 F.Supp. 252, 284 (E.D. Mich. 1977); *Creamer v. State*, 205 S.E.2d 240, 242 (1974); *People v. Smrekar* 385 N.E.2d 848, 853 (1979); *State v. Jorgensen*, 492 P.2d 312, 315 (1971)).

¹⁰⁴ *Shirley*, 723 P.2d at 1366–67.

¹⁰⁵ *Id.* at 1355. Following *Shirley*, the California legislature passed Cal. Evid. Code § 795 (2024), which significantly limits the introduction of testimony from a witness who was hypnotized about the events they would testify to. *See People v. Alexander*, 235 P.3d 873, 879–83 (Cal. 2010) (discussing the evidentiary rule and *Shirley*).

¹⁰⁶ 3A CIPES, BERNSTEIN & HALL, *supra* note 77, § 68A.03.

¹⁰⁷ *Id.*

Changes in how courts view the efficacy and admissibility of hypnosis and bite marks show just how ineffective this evidence can be; but while courts have responded to some forms of ineffective evidence, there are other technologies that are created outside of the scientific community that also deserve scrutiny.

911 call interpretation is such a field. In 2019, a young mother named Jessica Logan called 911 when her child stopped breathing.¹⁰⁸ Jayden was a 19-month-old baby with a history of respiratory issues for several weeks, including four admissions to the hospital.¹⁰⁹ On one of these admissions, he had been prescribed breathing treatments, which his mother tried to administer that night—instead, she found him already in the throes of rigor mortis by the time she realized something was wrong.¹¹⁰

But Jessica's situation became even worse, if that could be possible, once she called for help. In her subsequent trial for killing Jayden, the jury heard evidence from a police officer who interpreted her 911 call as an act staged to cover up the baby's murder.¹¹¹ That officer had taken a two-day law enforcement training course called "911 homicide: Is the caller the killer?" at a nearby community college.¹¹² The crux of the training is that attendees will leave with the "power to solve murders by listening to a 911 call."¹¹³ Because Jessica "did not explain precisely what had happened until almost a minute into the 911 call, and . . . never explicitly asked for an ambulance for Jayden," the detective testified that her call itself indicated her guilt.¹¹⁴ During her trial, he testified that:

She gave information in an inappropriate order. Some answers were too short. She equivocated. She repeated herself several times with "attempts to convince" the dispatcher of Jayden's breathing problems. She was more focused on herself than her son: I need my baby instead of I need help for my baby. And when asked if Jayden was beyond any help, Logan said, "I think he's gone." She had "already accepted that Jayden was deceased," Matthews noted in his report. According to the detective, almost everything Logan said—and didn't say—was evidence of her guilt.¹¹⁵

Jessica, a young victim of domestic violence, was so learning disabled that she qualified for government benefits after graduating high school, where she needed the questions on her exams read to her as an accommodation for her ability.¹¹⁶ She was poor but did her best to keep a roof over her family's head

¹⁰⁸ Brett Murphy, *How Jessica Logan's Call for Help Became Evidence Against Her*, PROPUBLICA (Nov. 20, 2022), <https://www.propublica.org/article/911-call-analysis-jessica-logan-evidence> [https://perma.cc/Y5TE-2QF8].

¹⁰⁹ *Id.*

¹¹⁰ *Id.*

¹¹¹ *Id.*

¹¹² *Id.*

¹¹³ *Id.*

¹¹⁴ *Id.*

¹¹⁵ *Id.*

¹¹⁶ *Id.*

with the help of Section 8 and her family.¹¹⁷ Instead of using this information to explain why she, in a moment of sheer panic, might not have known what to say to a dispatcher, the prosecution twisted it into a motive—financial stress.¹¹⁸ And although the investigators never tested the baby's bedding for lung fluid, nor had any other direct evidence of murder, the jury convicted Jessica.¹¹⁹ Her case is currently on appeal.¹²⁰

While the field of hypnosis includes at least some empirical study,¹²¹ 911 call analysis is largely presented, if not wholly created, by law enforcement and as such is not subject to peer review, statistical analysis, or any other empirical process. The theory that a 911 call itself can be evidence of guilt through tone of voice, language choice, or a lack of emotion was created by a retired deputy police chief named Tracy Harpster.¹²² Harpster possesses no scientific training—he created his program as an offshoot of his master's thesis in criminal justice, where he listened to one hundred recordings to claim that certain indicators correlate with guilt and others with innocence.¹²³ These “indicators of guilt” include responses to dispatch questions like “Huh?” and an isolated “please.”¹²⁴ Did the caller give extraneous information? Was there little urgency in her voice? Was there a “lack of sensory details?” Each of these can show that a call is “dirty,” and a caller therefore guilty of, well, something.¹²⁵

Unfortunately for many criminal defendants, 911 call analysis is, in short, junk.¹²⁶

Twenty researchers from seven federal government agencies, universities and advocacy groups have tested Harpster's model against other samples of 911 calls to see if the guilty indicators he had identified did, in fact, correlate with guilt. They've consistently found no such relationship for most of the indicators. In two separate studies, experts at the FBI's Behavioral Analysis Unit warned law enforcement officials to exercise caution when using 911 call analysis because their results contradicted so many of Harpster's claims.¹²⁷

¹¹⁷ *Id.*

¹¹⁸ See *id.* The prosecutor even “warned the jury not to infantilize Logan or excuse what she'd done because she's ‘not very bright.’” *Id.*

¹¹⁹ *Id.*

¹²⁰ *Id.*

¹²¹ See generally Jenny Rosendahl, Cameron T. Alldredge & Antonia Haddenhorst, *Meta-Analytic Evidence on the Efficacy of Hypnosis for Mental and Somatic Health Issues: A 20-Year Perspective*, 14 *FRONTIERS IN PSYCH.* 1 (2024) [doi: 10.3389/fpsyg.2023.1330238].

¹²² Tracy Harpster, L. & JUS. COMM'N, <https://mtu8.com/instructor/tracy-harpster/> [https://perma.cc/364A-YA6M].

¹²³ See Brett Murphy, *They Called 911 for Help. Police and Prosecutors Used a New Junk Science to Decide They Were Liars*, *PROPUBLICA* (Dec. 28, 2022), <https://www.propublica.org/article/911-call-analysis-fbi-police-courts> [https://perma.cc/Q7NW-38V3].

¹²⁴ *Id.*

¹²⁵ *Id.*

¹²⁶ *Id.* It might be called “junk science,” but there is really no scientific basis for it whatsoever.

¹²⁷ Murphy, *supra* note 108 (citing Daniel E. O'Donnell et al., “My Child is Missing”: 911 Calls in Mysterious Disappearances of Children, *AGGRESSION & VIOLENT BEHAV.*, NOV.–DEC. 2022 [https://doi.org/10.1016/j.avb.2022.101795]; Michelle L. Miller et al., “911 What's Your Emergency?": Deception in 911 Homicide and Suicide Staged as Homicide Calls, 25 *HOMICIDE STUD.* 256 (2021) [https://doi.org/10.1177/1088767920948242]).

Further, Harpster's specious methods have met with pushback in legal circles even while other fields accept it. Investigators from ProPublica have reported on 911 call analysis and found more than 100 cases in twenty-six states where the technique has been used to convict defendants.¹²⁸ Following ProPublica's analysis, judges and prosecutors nationwide have become more skeptical of the techniques. Agencies in Ohio, North Carolina, Texas, and Colorado have either warned lawyers about the potential injustices, stated concern that the technique undermines the integrity of convictions, or distanced themselves from it altogether.¹²⁹ However, Miriam Krinsky and Isabelle Cohn nevertheless write that "[t]his concerning approach continues to spread across the country, despite the risk it poses to innocent people who were simply calling 911 to seek help."¹³⁰ They argue that "prosecutors would be well advised to review any investigation and prosecution that relied on this questionable technique" and "policymakers and law enforcement leaders should consider banning this technique nationwide."¹³¹

Like 911 call analysis, voice stress tests use speech indicators to "determine" whether the speaker is being truthful—and, yet again, oversight of the technique is squarely in the hands of the law enforcement officers who created it. Voice Stress Analysis (VSA) is often conducted through the use of computerized equipment and is largely overseen by a company called the National Institute for Truth Verification Federal Services (NITV).¹³² With an official-looking website, save the conspicuous misspelling of the word "excellence,"¹³³ one could be easily convinced that the company is an offshoot of the federal government. The company touts that their Computer Voice Stress Analyzer product is only sold to government and law enforcement agencies, over 3,000 of which currently use it to determine whether subjects are lying when giving statements.¹³⁴ Training to use this system involves a five-day proprietary course run by the company, which also hosts seminars and "continuing education" on their products at their headquarters in "balmy West Palm Beach, Florida."¹³⁵ The headquarters even boasts a helipad should attendees wish to travel by helicopter to learn about the technology.¹³⁶

Voice stress analysis is perhaps the clearest example of how these police-created fields that enjoy law enforcement indicia of credibility have, in reality, no real scientific proof of validity. The company touts their product as being

¹²⁸ Brett Murphy, *Prosecutors and Judges Push for Ban on 911 Call Analysis*, GOVERNING (Mar. 19, 2023) <https://www.governing.com/now/prosecutors-and-judges-push-for-ban-on-911-call-analysis> [<https://perma.cc/T9P3-4B5B>].

¹²⁹ *Id.*

¹³⁰ Miriam Krinsky & Isabelle Cohn, *911 Call Scrutiny Should Not Be Used To Identify Suspects*, LAW 360 (Feb. 2, 2024), <https://www.law360.com/articles/1793107/911-call-scrutiny-should-not-be-used-to-identify-suspects> [<https://perma.cc/R2Q7-GTAP>].

¹³¹ *Id.*

¹³² NITV Federal Services, NITV FED. SERVS., <https://www.cvsa1.com/about> [<https://perma.cc/Q536-PP84>].

¹³³ NITV FED. SERVS, <https://www.cvsa1.com/> [<https://perma.cc/AEP3-2BY6>].

¹³⁴ *Id.*

¹³⁵ CVSA Certified Examiner's Course, NITV FED. SERVS, <https://www.cvsa1.com/training/cvsa-certified-examiners-course/> [<https://perma.cc/CDV2-72QW>]; NITV Federal Services, *supra* note 132.

¹³⁶ NITV Federal Services, *supra* note 132.

scientifically sound—yet produces precious little information to support that claim. Their homepage calls the product “the most accurate truth verification technology” and intimates that any backlash the product receives is just pushback from a competing technology—the polygraph.¹³⁷ Polygraphs, once heavily used in law enforcement, are nearly universally excluded from evidence in most states, based on their limited reliability.¹³⁸ Thus, the NITV’s website attempts to set up the two technologies as competing factions in the war against lies—going so far as to accuse the polygraphy community of “hijacking” the Wikipedia page on voice stress testing.¹³⁹ The website goes on to provide “evidence” of scientific proof that their proprietary VSA is accurate—but the studies listed either are not peer reviewed, are outdated, or do not address the issue of scientific reliability.¹⁴⁰

The federal government, however, studied the accuracy of VSA back in 2003, and concluded that it was virtually useless in detecting lies. In a report titled *Voice Stress Analysis: Only 15 Percent of Lies About Drug Use Detected in Field Test*, the National Institute of Justice (NIJ) discussed their statistical analyses of voice VSA.¹⁴¹ The institute funded field evaluations of two programs used within the Oklahoma Department of Mental Health, where more than 300 arrestees were questioned about recent drug use.¹⁴² The answers to the questions were then compared to the subjects’ drug test results to determine whether they had been truthful.¹⁴³ In determining that VSA was ineffective in uncovering lies, the institute found:

Fifteen percent [of respondents] who said they had not used drugs—but who, according to their urine tests, had—were correctly identified by the VSA programs as being deceptive [while] eight and a half percent who were telling the truth—that is, their urine tests were consistent with their statements that they had or had not used drugs—were incorrectly classified by the VSA programs as being deceptive.¹⁴⁴

¹³⁷ NITV FED. SERVS., *supra* note 133.

¹³⁸ See AM. PSYCH. ASS’N, *Do “Lie Detectors” Work? What Psychological Science Says About Polygraphs* (Oct. 14, 2025), <https://www.apa.org/topics/cognitive-neuroscience/polygraph> [https://perma.cc/A6V4-BS3B]; see also 29A AM. JUR. 2D EVIDENCE § 999 (“The results of a polygraph examination and an accused’s offer to take a polygraph examination are generally inadmissible in a criminal trial.”).

¹³⁹ *Wikipedia Alert—VSA Article Hijacked*, NITV FED. SERVS., www.cvsa1.com/wikipedia-alert-vsa-article-hijacked/ [https://perma.cc/B52G-8KY2] (last accessed Sep. 22, 2025).

¹⁴⁰ *Research and Recent Studies on the Science of Voice Stress Analysis*, NITV FED. SERVS., <https://www.cvsa1.com/research-and-recent-studies-on-the-science-of-voice-stress-analysis/> [https://perma.cc/2E64-YN3] (last accessed Sep. 22, 2025).

¹⁴¹ Kelly R. Damphouse, *Voice Stress Analysis: Only 15 Percent of Lies About Drug Use Detected in Field Test*, NAT’L INST. OF JUST., (Mar. 16, 2008), <https://nij.ojp.gov/topics/articles/voice-stress-analysis-only-15-percent-lies-about-drug-use-detected-field-test> [https://perma.cc/TTJ5-9EK3].

¹⁴² *Id.*

¹⁴³ *Id.*

¹⁴⁴ *Id.*

Using those findings, the NIJ determined that the programs' ability to accurately detect deception was about fifty percent—no greater than a coin flip.¹⁴⁵

The NIJ did discuss that speech patterns can differ under stress, but “it is unclear whether VSA can detect *deception-related* stress.” Was this an issue in Jessica Logan’s 911 call, the one that helped convict her of murdering her child? It is difficult to conceive of a more stressful situation than waking up to find your infant dead and his body already stiff in his bed. VSA, unfortunately, seems ill suited to determine whether Jessica’s speech in the 911 call she made was deceptive or simply showing indicia of stress—but the officer who testified was clear that almost everything she said in the call was evidence of her guilt.

Ultimately, the NIJ closed their analysis by concluding that there may be no evidentiary use for this technology,¹⁴⁶ and courts across the country have followed suit. For example, in *State v. Arnold*, the Louisiana Court of Appeals reviewed a murder trial in which the defendant had not been allowed to introduce VSA results.¹⁴⁷ In that case, the defendant gave a statement to the police that supported his innocence in the shootings of his wife and another man.¹⁴⁸ He subsequently took a VSA test on the same statement and was told he passed—meaning his statement had been truthful.¹⁴⁹ He moved to admit the results of that test at his trial and was denied such on the basis that VSA tests are legally inadmissible.¹⁵⁰ In reviewing his appeal, the court relied on *United States v. Traficant*, which compared the “long line of cases which reject the admissibility of polygraph test results at trial” to VSA.¹⁵¹ The *Traficant* court, under a *Frye*¹⁵² analysis, noted that “several studies revealed that [voice stress] testing results yielded an accuracy rate only slightly higher than, and in some cases lower than, chance expectancy rates.”¹⁵³ The court in *Arnold* followed suit.¹⁵⁴

¹⁴⁵ *Id.*

¹⁴⁶ *Id.*

¹⁴⁷ *State v. Arnold*, 533 So. 2d 1311 (La. Ct. App. 1988).

¹⁴⁸ *Id.* at 1312 (“Defendant gave a tape-recorded oral statement to a Deputy Sheriff at the scene. Defendant stated that he had brought St. Julien to his home that afternoon to perform yard work and that he intended to assist St. Julien. Defendant then allegedly went into the bathroom to change his clothes. From his position in the bathroom, he recalled hearing gunshots in the den, just minutes after St. Julien was brought into the house. Defendant stated that he ran into the den and observed St. Julien holding his .22 caliber rifle and Mrs. Arnold’s body lying on the floor. At this point, St. Julien saw him and attempted to flee. A struggle ensued in a hallway, in which defendant successfully wrestled the rifle from St. Julien and shot him several times. After examining his wife’s body and discovering she was dead, defendant returned to St. Julien’s body and, in a fit of anger, emptied the rifle into him.”)

¹⁴⁹ *Id.* at 1313.

¹⁵⁰ *Id.*

¹⁵¹ *Id.* at 1314 (citing *United States v. Traficant*, 566 F. Supp. 1046, 1047 (N.D. Ohio 1983)).

¹⁵² *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923) set the standard for admission of scientific testimony at that which “has general acceptance” in the field. It has since been superseded by *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), which uses a stricter standard of scientific reliability based on scientifically valid reasoning and methodology. See *supra* note 90. Presumably, if VSA fails under *Frye*, it would have virtually no chance of admission under *Daubert*.

¹⁵³ *Traficant*, 566 F. Supp. at 1047.

¹⁵⁴ *Arnold*, 533 So. 2d at 1313–16.

Academic analysis also suggests this technology may be ineffective. In *Voice Stress Analysis: Is “Some Evidence” Sufficient Grounds for Making Legal Determinations*, Brad McCall reviews the recent science relative to VSA technology by examining the popular NITV product.¹⁵⁵ After discussing the company’s history and alleged superiority to polygraphy, with its “greater than 98% accuracy rate,” McCall compares the NITV’s “scientific” evidence with peer reviewed studies on its efficacy. “In one study, in which 911 emergency call recordings were analyzed, researchers were able to predict stress in the voice with about 80% accuracy by evaluating components of the speech, primarily pitch.”¹⁵⁶ Since “stress” is not synonymous with guilt, evidence with only eighty percent accuracy runs the risk of unfairly prejudicing any jury that hears it. Further, there is evidence to show that the initial study the NITV relied on to prove the accuracy of its product may not even actually exist. McCall indicates that professors of linguistics have been unable to confirm that the journal cited by the NITV is real, and they argue that the publication could be a fraud created to provide justification for the company’s technology.¹⁵⁷

McCall concluded that “[a]lmost without exception, courts faced with a request to admit VSA test results during a criminal trial have rejected the offer.”¹⁵⁸ Rationales for this exclusion vary, with most courts finding the testimony unreliable, prejudicial, or lacking any meaningful scientific analysis. This is little comfort for Jessica Logan, as her conviction relied on this testimony—not unlike a similar defendant in *State v. Schiefelbein*.¹⁵⁹ In both cases, the appellate bench has so far declined to overturn their convictions; in *Schiefelbein*, while the court held that the VSA testimony was improper and the state’s cross-examination on it “misleading, factually incorrect, and irrelevant,” the court concluded that the error did not justify a reversal.¹⁶⁰

“Expert” police evidence is still accepted in many modern courtrooms. In the past decade or so, journalists have reported in depth on some specious techniques that are still popular among the bar today. For instance, bloodstain pattern analysis is relatively popular, but its reliability:

has never been definitively proven or quantified. . . . While there is no index that lists cases in which bloodstain-pattern analysis played a role, state appellate court rulings show that the technique has played a factor in felony cases across the country. Additionally, it has helped send innocent people to prison. From Oregon to Texas to New York, convictions that hinged on the testimony of bloodstain-pattern analysts, arson investigators, and other police witnesses have been overturned and the defendants acquitted or the charges dropped.¹⁶¹

¹⁵⁵ Brad McCall, *Voice Stress Analysis: Is “Some Evidence” Sufficient Grounds for Making Legal Determinations?*, 1 BARRY L. REV. 29, 30 (2024).

¹⁵⁶ *Id.* (citing Grazyna Demenko & Magdalena Jastrzebska, *Analysis of Voice Stress in Call Centers Conversations*, in PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON SPEECH PROSODY 183, 185 (2012)).

¹⁵⁷ *Id.* at 40.

¹⁵⁸ *Id.* at 48.

¹⁵⁹ *State v. Schiefelbein*, 230 S.W.3d 88 (Tenn. Crim. App. 2007).

¹⁶⁰ *Id.* at 134.

¹⁶¹ Kovatch, Colloff & Murphy, *supra* note 69.

A wide variety of this “junk science” is still judicially popular, and has seen little judicial scrutiny even amid growing concerns.

1. *Arson*

Angela Garcia is not the only person convicted of arson based on the pseudoscience of burn patterns—and at least one man has been executed based on similar testimony. Two days before Christmas 1991, Stacy Kuykendall left her home in Corsicana, Texas to go Christmas shopping for her three children, two-year-old Amber Louise Willingham, and one-year-old twins, Karmon Diane Willingham and Kameron Marie Willingham.¹⁶² The children were at home sleeping with their father, Cameron “Todd” Willingham, when a fire broke out in the family’s house.¹⁶³ Neighbors, responding to the Willinghams’ yard when they smelled smoke, saw Todd “standing on the front porch, wearing only a pair of jeans, his chest blackened with soot, his hair and eyelids singed. He was screaming, “My babies are burning up!”¹⁶⁴

Witnesses reported feeling intense heat radiating off the home and within moments windows started exploding and flames “blew out” of them.¹⁶⁵ First responders wrestled Todd to the ground and handcuffed him to keep him out of the burning home where his children were still inside.¹⁶⁶ For his part, Todd could do little but watch as a firefighter gave Amber CPR that would prove fruitless; none of the three children survived the fire.¹⁶⁷

Corsicana Fire Department (CFD) Investigators responded to the fire and immediately reviewed the scene as soon as the fire was out.¹⁶⁸ They subsequently requested more assistance from the State Fire Marshal’s Office (SFMO), and were joined by deputy fire marshal Manuel Vasquez.¹⁶⁹ The responding officer from CFD, Douglas Fogg, says he had “battled the beast” of fire for twenty years and was later quoted at trial as saying things like “[y]ou learn that fire talks to you.”¹⁷⁰ Vasquez was also a seasoned fire investigator with his own catchphrases like “[f]ire does not destroy evidence—it creates it” and “[t]he fire tells the story. I am just the interpreter.”¹⁷¹

¹⁶² David Grann, *Trial By Fire*, NEW YORKER (Aug. 31, 2009), <https://www.newyorker.com/magazine/2009/09/07/trial-by-fire> [<https://perma.cc/37W7-PFGB>].

¹⁶³ *Id.* Many reports refer to Todd with his full name, Cameron Todd Willingham. Willingham typically used his middle name, Todd, as will this article.

¹⁶⁴ *Id.*

¹⁶⁵ *Id.*

¹⁶⁶ *Id.*

¹⁶⁷ *Id.*

¹⁶⁸ *Id.* See also TEX. FORENSIC SCI. COMM’N, FINAL REPORT ON COMPLAINT NO. 09.01, THE INNOCENCE PROJECT FOR CAMERON TODD WILLINGHAM & ERNEST RAY WILLIS 8 (2011), <https://www.txcourts.gov/media/1454542/fr-willingham-mka-new-version-03162022.pdf> [<https://perma.cc/BS9Z-7M5V>].

¹⁶⁹ Grann, *supra* note 162.

¹⁷⁰ *Id.*

¹⁷¹ *Id.*

Ultimately, Willingham was charged with capital murder and arson, and Vasquez was the chief expert witness at his trial.¹⁷² During the guilt phase, “Vasquez . . . testified that, based on the burn patterns and pour patterns and the stains on the concrete front porch, the fire was set intentionally with the use of an accelerant.”¹⁷³ He said that Willingham had told him “that his daughter had awakened him while he was sleeping, the bedroom was full of smoke, he kicked open the door with his bare foot, and he ran down the hallway and out the door.”¹⁷⁴ In his opinion, Willingham’s version of the incident was a lie; he could not have exited the house after it was on fire without sustaining injury to his feet or substantial smoke inhalation damage.¹⁷⁵ He did not believe Willingham’s two-year-old daughter could have started the fire.¹⁷⁶ Finally, Vasquez testified that it was his opinion that Willingham purposefully started the fire.¹⁷⁷ Following Vasquez’s expert testimony, Willingham was convicted of capital murder in 1992 and was put to death by the state of Texas in 2004.¹⁷⁸

Both before and after Willingham’s execution, there has been significant scrutiny towards the expert testimony used to convict him. Neither Fogg nor Vasquez was a fire scientist—each was a trained member of law enforcement, but that training didn’t include a degree in any forensic or scientific field. The training Fogg and Vasquez had focused chiefly on fire prevention and suppression, not the investigation of fires and not forensic science. For example, Vasquez was a deputy fire marshal at the time of the trial. In Texas, the Commission on Fire Protection (TCFP) recommends that a basic Fire Marshal have 112 hours total of training.¹⁷⁹ These 112 hours include courses on administrative duties, community relations, and regulations; only mere twenty hours is dedicated towards fire investigations.¹⁸⁰ Douglas Fogg on the other hand, was not a fire marshal but an assistant fire chief in Corsicana, Texas. Texas requires a chief to have five years’ experience appointed in a fire suppression position in Texas while holding active TCFP certification or have ten years of experience as an active volunteer fire fighter.¹⁸¹ These standards are not unlike those of a police officer, who might attend an academy led by other officers over three to six months to qualify for the post.

¹⁷² Willingham v. Cockrell, 61 Fed. App’x. 918, 2003 U.S. App. LEXIS 28134, *23 (5th Cir. 2003).

¹⁷³ *Id.*

¹⁷⁴ *Id.*

¹⁷⁵ *Id.*

¹⁷⁶ *Id.*

¹⁷⁷ *Id.*

¹⁷⁸ *Id.* at *2. See also TEX. FORENSIC SCI. COMM’N, *supra* note 168, at 7–9.

¹⁷⁹ TEX. COMM’N ON FIRE PROTECTION, CERTIFICATION CURRICULUM MANUAL 15-5 (2023) https://www.tcfp.texas.gov/Services/GetPdf?filename=%2FManual%2FCurriculum%2Fcurriculum_Chapter_15%5B2023.8.1%5D.pdf [<https://perma.cc/N2YN-FL9Z>].

¹⁸⁰ *Id.*

¹⁸¹ *Head of Department*, TEX. COMM’N ON FIRE PROTECTION, <https://www.tcfp.texas.gov/services/certificate?CertificateSlug=Head-of-department> [<https://perma.cc/NT6G-7RRX>] (last accessed Sep. 22, 2025).

Shortly before Willingham was executed, Dr. Gerald Hurst was retained to review the evidence from Willingham's trial.¹⁸² Hurst has a doctorate in chemistry, spent most of three decades working in the private sector as a fire and explosives expert, and worked as an expert for hire in civil cases relative to the cause of a fire.¹⁸³ His experience also includes testifying, pro bono, in dozens of arson cases around the country as an expert witness for the defense.¹⁸⁴ He has reviewed the forensic evidence in multiple criminal arson cases and found it lacking in several, including Willingham's.¹⁸⁵

When reviewing the evidence in Willingham's case in anticipation of further litigation, he "saw immediately that investigators had used outdated assumptions to convict Willingham." Working against the clock, he wrote a report that debunked much of the physical evidence.¹⁸⁶ Hurst's report stands in harsh contrast to the evidence that Vasquez and Fogg testified to, and it relied on new technology that had become standard in the field of arson science.¹⁸⁷ It listed six key references, including one prepared by FEMA and the United States Fire Administration.¹⁸⁸ It examined evidence like trailers, pour patterns, and puddle configurations, it looked for evidence of accelerants, and opined on the importance of crazed glass—all of this standard in modern fire investigations.¹⁸⁹ Hurst concluded in his report that "most of the conclusions reached by [Fogg and Vasquez] would be considered invalid in light of current knowledge."¹⁹⁰

None of this was examined at all in Vasquez's cross-examination, who testified "[t]he fire does not lie. It tells me the truth."¹⁹¹ And "in the two decades since Willingham was sentenced to death for murder by arson, scientific progress has disproved or cast doubt on the specific 'arson indicators' Vasquez so confidently listed in court" like burn patterns.¹⁹² After Willingham was executed, the Texas Forensic Science Commission reviewed his case in light of the changing science on arson investigations; Vasquez "was wrong about several key points."¹⁹³ In an investigation of his testimony, the *Austin American-Statesman* detailed:

¹⁸² Dave Mann, *Fire and Innocence*, TEX. OBSERVER (Dec. 3, 2009), <https://www.texasobserver.org/fire-and-innocence/> [https://perma.cc/RG5L-Q38T].

¹⁸³ *Id.*

¹⁸⁴ *Id.*

¹⁸⁵ *Id.*

¹⁸⁶ *Id.*

¹⁸⁷ See Report of Dr. Gerald Hurst, at 2–3, Cameron Todd Willingham, No. 24,4670 (B) (366th Jud. D.), <https://www.texasobserver.org/wp-content/legacy/uploads/files/hurstreport.pdf> [https://perma.cc/M3RF-46QR]. The report was entered into Willingham's case before he was executed.

¹⁸⁸ *Id.*

¹⁸⁹ *Id.* at 3–4.

¹⁹⁰ *Id.*

¹⁹¹ Chuck Lindell, *Fire Investigator in Spotlight as Willingham Review Nears End*, AUSTIN AMERICAN-STATESMAN (Mar. 12, 2011) <https://www.statesman.com/story/news/2011/03/13/fire-investigator-in-spotlight-as/6701725007/> [https://perma.cc/7A8G-668E].

¹⁹² *Id.*

¹⁹³ *Id.*

Contrary to his testimony, blown-out windows, melted aluminum thresholds and discolored bedsprings are not sure signs that an ignitable liquid was present, nor do accelerant-fueled fires burn far hotter than “normal” ones. Other indicators that Vasquez attributed to a liquid accelerant—including burn patterns on the floor, brown stains on concrete and peeled vinyl tiles—also are found in accidental or natural fires, and modern investigators are cautioned against basing arson findings solely on such clues. In fact, at least eight nationally known fire experts have said Vasquez—like many fire investigators of his day—had a poor knowledge of fire dynamics and misinterpreted or misunderstood every indicator that he presented to jurors as emphatic proof of arson and Willingham’s guilt.¹⁹⁴

Ultimately, in 2011, the Texas Forensic Science Commission completed a more-than-900 page report on Willingham’s case.¹⁹⁵ The Commission determined Vasquez’s testimony to be completely inaccurate and referenced it, saying “[t]he statement that ‘a fire does not lie’ is true, but we have all seen numerous instances where a fire was grossly misinterpreted. This, sadly, is such an instance.”¹⁹⁶

2. *Bloodstain Pattern Analysis*

On October 13, 1997, ten-year-old Joel Kirkpatrick was asleep in his Lawrenceville, Illinois home.¹⁹⁷ His mother, Julie Rea, heard a scream in the middle of the night and found an intruder in a ski mask—she struggled with him and then ran to a neighbor’s home for help.¹⁹⁸ Julie, a single mom working on her PhD, was unable to save her son who had been murdered on his bedroom floor.¹⁹⁹ Joel had been stabbed twelve times, twice through his aorta.²⁰⁰ Julie “was taken to the hospital with a black eye, rug burns on her knees, a wound on her right arm that required stitches, and scratches and abrasions on her head, both shoulders and the tops of her feet.”²⁰¹

¹⁹⁴ *Id.*

¹⁹⁵ TEX. FORENSIC SCI. COMM’N, *supra* note 168.

¹⁹⁶ *Id.* at 19. The report “gathered and reviewed thousands of pages of documents and received extensive input from fire scientists and investigators. Commissioners have also heard public comment at numerous meetings.” *Id.* at 7. It “convened an expert panel during which Ed Salazar, Assistant State Fire Marshal of the SFMO, Dr. John DeHaan, Dr. Craig Beyler and Houston fire investigator Buddy Wood provided extensive comments and responded to questions from Commissioners. The FSC also heard brief comments from Paul Maldonado, the Texas State Fire Marshal, and Ed Cheever, fire investigator for the SFMO.” *Id.* It contained hundreds of supplementary exhibits and was thoroughly investigated. *See generally id.*

¹⁹⁷ Pamela Colloff, *Bloodstain Analysis Convinced a Jury She Stabbed Her 10-Year-Old Son. Now, Even Freedom Can’t Give Her Back Her Life.*, PROPUBLICA (Dec. 20, 2018), <https://www.propublica.org/article/bloodstain-pattern-analysis-jury-wrongful-conviction-acquitted-exonerated> [<https://perma.cc/APX8-FVDK>].

¹⁹⁸ *Id.*

¹⁹⁹ *Id.*

²⁰⁰ *Id.*

²⁰¹ *Id.*

Notwithstanding the injuries Julie received in the fight with her assailant, her lack of a criminal record, and an absence of any mental health issues, she was convicted of killing her son three years later after “a deeply flawed investigation.”²⁰² Prosecutors used a forensic discipline called bloodstain-pattern analysis (sometimes referred to as blood spatter analysis) to argue that an intruder never entered her home on the night of the crime and that Rea was, in fact, her son’s killer.²⁰³ She was convicted, largely on the strength of the testimony of two bloodstain-pattern analysts.²⁰⁴

The investigation in Julie’s case focused on her from the outset. “Investigators dug up her septic tank, inspected her sink and shower drains, and examined the clothes in her washing machine. They sprayed luminol, a chemical that detects the presence of blood, around her house. They found nothing.”²⁰⁵ There was no evidence of motive, and no fingerprints were found on the alleged murder weapon—a steak knife pulled from her own butcher block.²⁰⁶ So, with “no eyewitnesses, little forensic evidence and no motive,”²⁰⁷ experts for the prosecution relied on bloodstain-pattern analysis to convict her.

Bloodstain-pattern analysis is rooted in the belief that the drops, spatters and trails of blood at a crime scene are rich repositories of information that can be used to reverse engineer and even reconstruct crimes. Many practitioners are law enforcement officers, not scientists. But their expert testimony often lends a sense of scientific certainty to circumstantial cases, and it can be a powerful tool in the hands of prosecutors.²⁰⁸

The “experts” who testified in Julie’s case were police officers, not scientists. The first was Rod Englert, a retired police detective and past president of the International Association of Bloodstain Pattern Analysts (IABPA).²⁰⁹ The IABPA includes an education committee that has recommended guidelines for basic bloodstain pattern analysis training courses. The guidelines require content like lectures on the characteristics of liquid blood droplets and exercises on transfer stains for a total of forty hours of training.²¹⁰

Englert testified at Julie’s trial that the crime scene had been staged, that there was no evidence of a struggle, and that there was no intruder, based on his “experience of having gone to many, many scenes, many like [that], hundreds of scenes.”²¹¹ His testimony was primarily based on the stain patterns in the home while Dexter Bartlett, a crime scene investigator with

²⁰² *Id.*

²⁰³ *Id.*

²⁰⁴ *Id.*

²⁰⁵ *Id.*

²⁰⁶ *Id.*

²⁰⁷ *Id.*

²⁰⁸ *Id.*

²⁰⁹ *Id.*

²¹⁰ INT’L ASS’N OF BLOODSTAIN PATTERN ANALYSTS, BLOODSTAIN PATTERN ANALYSIS BASIC COURSE 1, https://www.iabpa.org/bpa_training_standards.php [<https://perma.cc/NR29-SCCN>] (last accessed Sep. 22, 2025).

²¹¹ Colloff, *supra* note 197.

the Illinois State Police testified about the bloodstains on her t-shirt.²¹² DNA analysis indicated that some small stains on her shirt were her own blood, but at least one small stain belonged to her son.²¹³ Bartlett testified that “Joel’s blood could not have transferred onto her shirt and was more consistent with her wielding a weapon.”²¹⁴ However, “Bartlett offered no proof of this—no experiments he had conducted, no data and no explanation of the methodology he used to come to his conclusions.”²¹⁵

Both officer expert witnesses who testified for the state to the bloodstain pattern evidence in Julie’s case had similar and all too common backgrounds. Bartlett’s LinkedIn profile shows the standard level of training that police experts have when they become trainers for other officers—decades of police work, but no advanced degrees.²¹⁶ Bartlett teaches a “Bloodstained Pattern Analysis and Identification Course” at the Chicago Police Academy and runs his own Forensic Consultant “operation.”²¹⁷ Bartlett holds an associate of arts degree in Criminal Justice; otherwise, he has years of experience working crime scenes as an officer.²¹⁸ Englert’s bio, meanwhile, is prominently displayed on his website; he has a bachelor’s degree in Police Administration and “has done post-graduate work in psychology.”²¹⁹ He has “consulted in over 500 criminal and civil death cases in the United States. He has testified and is a qualified court expert in homicide in 26 states.”²²⁰

Julie had her own expert at trial, Paul Kish, who testified that her son’s blood had “transferred onto” her shirt because it “rested on top of the fibers” and “had not penetrated the weave of the fabric, as blood cast off of a weapon would be expected to do.”²²¹ Kish is a forensic consultant and holds a B.S. in Criminal Justice and an M.S. in Education.²²² Like Englert and Bartlett, Kish marks himself as an “internationally known lecturer on the subject of bloodstain pattern analysis lecturing throughout the United States, as well as in Canada, England, the Netherlands, and Sweden” who has “educated over 1000 students from 18 countries during week-long courses on bloodstain pattern analysis.”²²³

None of the three forensic experts at Julie’s trial possessed an advanced degree or even any significant undergraduate or graduate training in biology, chemistry, physics, or any other scientific field. Yet, between them, these three witnesses have testified many, many times to the physical properties of

²¹² *Id.*

²¹³ *Id.*

²¹⁴ *Id.*

²¹⁵ *Id.*

²¹⁶ Dexter Bartlett, LINKEDIN, <https://www.linkedin.com/in/dexter-bartlett-3a533147/> [<https://perma.cc/L4XA-SU7U>] (last accessed Sep. 22, 2025).

²¹⁷ *Id.*

²¹⁸ *See id.*

²¹⁹ Bio, ENGLERT FORENSICS, <https://englertforensics.com/bio/> [<https://perma.cc/W7SJ-H7MK>] (last accessed Sep. 22, 2025).

²²⁰ *Id.*

²²¹ Colloff, *supra* note 197.

²²² About, PAUL KISH, <http://www.paulkish.com/about-paul-kish> [<https://perma.cc/XNT9-R2CL>] (last accessed Sep. 22, 2025).

²²³ *Id.*

blood—how it congeals, how it flows over time, and how it can be used to convict someone like Julie Rea of a crime she did not commit. In her case, the jury was tasked with determining which experts to believe. Julie’s public defender argued:

none of the claims made by the state’s bloodstain-pattern analysts could be verified; they had not conducted any experiments to test their conclusions. “That’s not scientific . . . [s]cience is about establishing: ‘This is scientific and true because I can recreate it. I can duplicate it. I know within a range that this can be done this way.’ There was no attempt to do that.”²²⁴

Even after her lawyer’s argument that the evidence against her was not scientific in nature, the jury convicted Julie Rea.²²⁵

It was not until 2004 that a serial killer named Tommy Lynn Sells confessed to Joel’s murder.²²⁶ After her conviction was overturned on other grounds, Julie’s 2006 retrial focused again on the bloodstain pattern analysis, and the prosecution again called Englert.²²⁷ But this time, he had a new theory—he testified that the source of the blood on her shirt was from Joel’s bloody hand pushed up against it.²²⁸ This theory came with no scientific testing,²²⁹ and no measurements of Joel’s hands for comparison, but the jury was left with the argument that Joel was pushing his mother away as she stabbed him with a knife from their own kitchen.²³⁰

At the second trial, Julie testified in her own defense, which combined with her experts and the taped confession of a serial killer was enough to win an acquittal.²³¹ However, the impact of four years behind bars and a struggle to get a job because of her conviction changed her life. She was ultimately formally exonerated in 2010, after the Downstate Illinois Innocence Project uncovered evidence that Sells, the serial murderer, was Joel’s actual killer.²³² Not only did he confess, but the physical evidence at the crime scene matched the details of his confession.²³³

²²⁴ Colloff, *supra* note 197.

²²⁵ *Id.*

²²⁶ *Id.*

²²⁷ *Id.*

²²⁸ *Id.*

²²⁹ The defense expert at her second trial challenged Englert on how he reached his conclusions: “I have seen nothing to indicate that this area was studied for that purpose, and data collected, comparisons made, and some sort of a conclusion or hypothesis drawn,” [he] said, referring to the T-shirt. “There is no scientific basis for making such a claim.” *Id.*

²³⁰ *Id.*

²³¹ *Id.*

²³² Julie Rea, THE ILL. INNOCENCE PROJECT, <https://www.uis.edu/illinoisinnocenceproject/julie-rea> [https://perma.cc/25P9-4DQZ] (last accessed Sep. 22, 2025).

²³³ A nurse who treated Julie documented rug burns on her leg. *Id.* Sells described to investigators how she clung to his leg as he dragged her inside the house. *Id.* There were fifty-three total points of corroboration of Sells’s confession. *Id.* There was also evidence that a deputy provided false testimony that he searched the back yard for footprints. *Id.*

Bloodstain pattern analysis is used in thousands of cases across the country, yet many experts question the scientific efficacy of its theories.²³⁴ The NAS's 2009 report questioned the evidence at work in bloodstain pattern analysis along with several other science-based disciplines that police officers often opine on.²³⁵ That report has since been used to fight the admission of such evidence in court. The Innocence Project describes it as serving “as the foundation for much of [their] science-driven, policy-based reform and strategic litigation efforts” since it “established a blueprint for forensic science research, engaged the scientific research community and spurred various meaningful science-based criminal justice reforms.”²³⁶

In 2022, the National Institute of Justice updated the findings from the 2009 report relative to bloodstain patterns—here, the NIJ reported that analysts’ methods are “largely based on subjective expert opinion.”²³⁷ The NIJ report reviewed a large-scale study of the accuracy and reproducibility of these analysts’ conclusions.²³⁸ The study investigated conclusions made by seventy-five practicing analysts on 192 patterns.²³⁹ Patterns were created by known actions, and the analysts were tasked with making conclusions about those patterns.²⁴⁰ Of the samples with known causes, 11.2 percent of the analysts’ responses were incorrect and nearly eight percent of the conclusions could not be correctly reproduced.²⁴¹ The researchers noted that “[b]oth semantic differences and contradictory interpretations contributed to errors and disagreements, which could have serious implications if they occurred in casework.”²⁴² Today, the science of bloodstain pattern analysis remains specious, at best, and a complete fabrication at worst.

Clearly, the bloodstain pattern analysis used in Julie Rea’s case was inaccurate. In cases where defense attorneys fight junk science, the ultimate win is an acquittal by a jury, but in Julie’s case, her full exoneration by the state combined with the corroborating evidence of Sells’s confession leads to the reasonable conclusion that the expert police officers who testified against her were simply wrong. Their testimony: that the blood stains at the crime scene

²³⁴ For a discussion of the history of the field as well as details on several illustrative cases, see Leora Smith, *How a Dubious Forensic Science Spread Like a Virus*, PROPUBLICA (Dec. 13, 2018), <https://features.propublica.org/blood-spatter-analysis/herbert-macdonell-forensic-evidence-judges-and-courts/> [<https://perma.cc/5WYS-XKNM>]. As recently as July 2024, state appeals courts are still reviewing bloodstain pattern analysis cases because courts across the country routinely allow it in as evidence at trial. See, e.g., *People v. Rhee*, No. 21CA1483, 2024 Colo. App. LEXIS 2516 (Colo. App. July 18, 2024); *People v. Dixon*, 224 N.E.3d 831 (Ill. App. Ct. 2022).

²³⁵ *Study Reports Error Rates for Bloodstain Pattern Analysis*, NAT’L INST. OF JUST. (Feb. 28, 2022), <https://nij.ojp.gov/topics/articles/study-reports-error-rates-bloodstain-pattern-analysis> [<https://perma.cc/PTF2-LTDK>]; see also NAT’L ACAD. OF SCI., *supra* note 62, at 177–79.

²³⁶ Innocence Staff, *Ten Years Later: The Lasting Impact of the 2009 NAS Report*, INNOCENCE PROJECT (Feb. 19, 2019) <https://innocenceproject.org/news/lasting-impact-of-2009-nas-report/> [<https://perma.cc/2YDC-UVGX>].

²³⁷ *Study Reports Error Rates for Bloodstain Pattern Analysis*, *supra* note 235.

²³⁸ R. Austin Hicklin et al., *Accuracy and Reproducibility of Conclusions by Forensic Bloodstain Pattern Analysts*, FORENSIC SCI. INT’L Aug. 2021, at 1 [<http://doi.org/10.1016/j.forsciint.2021.110856>].

²³⁹ *Id.* at 1–2.

²⁴⁰ *Id.*

²⁴¹ *Id.* at 2–5.

²⁴² *Id.* at 7.

proved there was no intruder, that there was no struggle, and that Joel was killed by the only person in his home who loved him, sent his innocent, grieving mother to jail for years.

And in at least one similar case, the blood spatter expert who sent an innocent man to jail later admitted that his conclusions were wrong. Joe Bryan, a former high school principal, was convicted of the 1985 murder of his wife Mickey.²⁴³ Police detective Robert Thorman testified at Bryan's trial that tiny flecks of blood found on a flashlight were evidence of back spatter, a pattern that indicated a close range shooting.²⁴⁴ His testimony tied the flashlight, found in Bryan's trunk four days after the murder, to the crime scene, and he opined that the "killer had likely held the flashlight in one hand while firing a pistol with the other."²⁴⁵

But years later, Thorman, who had the standard forty hours of bloodstain pattern training, testified that his "techniques and methodology were incorrect," and that his testimony was thus incorrect.²⁴⁶ This recantation came at a hearing brought about by the Innocence Project of Texas, which had filed a complaint asking for the Texas Forensic Science Commission to review Bryan's case.²⁴⁷ Thorman had testified at Bryan's trial that blood evaporated after traveling forty-six inches through the air, and that human blood had its own "characteristic geometric patterns;" neither contention is scientifically sound.²⁴⁸ In addition, another analyst told the Commission that the pattern Thorman relied on to determine that the flashlight was hit with blood "back spatter" didn't exist—it was not consistent with a close-range shooting.²⁴⁹ The Commission ultimately concluded that the blood pattern analysis was "absolutely unreliable."²⁵⁰ Unfortunately for Joe Bryan, the Texas Forensic Science Commission's report calling the evidence against him "egregiously wrong" did not convince a court to release him and he was not granted a new trial.²⁵¹ He was paroled in 2020 and died three years later.²⁵²

²⁴³ State v. Bryan, No. 11-17-00236-CR, 2019 Tex. App. LEXIS 10330, at *1 (Tex. App. Nov. 27, 2019); see also Pamela Colloff, *Blood-Spatter Expert in Joe Bryan Case Says "My Conclusions Were Wrong,"* PROPUBLICA (Sep. 17, 2018), <https://www.propublica.org/article/blood-spatter-expert-robert-thorman-joe-bryan-case> [<https://perma.cc/5ZH4-RUET>].

²⁴⁴ *Id.*

²⁴⁵ *Id.*

²⁴⁶ *Id.*

²⁴⁷ Joe Bryan, THE INNOCENCE PROJECT, (last accessed Sep. 22, 2025), <https://innocencetexas.org/cases/joe-bryan/> [<https://perma.cc/J9XK-Z8RW>].

²⁴⁸ Pamela Colloff, *He Has Spent Three Decades in Prison. Now Experts Dispute the Evidence.*, N.Y. TIMES (July 24, 2018), <https://www.nytimes.com/2018/07/24/us/joe-bryan-blood-spatter.html> [<https://perma.cc/8ZQT-6RSR>].

²⁴⁹ Colloff, *supra* note 243.

²⁵⁰ Joe Bryan, *supra* note 247.

²⁵¹ State v. Bryan, No. 11-17-00236-CR, 2019 Tex. App. LEXIS 10330 (Tex. App. Nov. 27, 2019); Pamela Colloff, *Influential Texas Commission Says Blood-Spatter Testimony in Joe Bryan's Murder Case Was "Not Accurate or Scientifically Supported,"* PROPUBLICA (July 24, 2018), <https://www.propublica.org/article/texas-forensic-science-commission-blood-spatter-evidence-testimony-murder-case-joe-bryan> [<https://perma.cc/4473-FH3F>].

²⁵² Trip Gabriel, *Joe D. Bryan, 84, Dies; His Murder Conviction Raised Troubling Questions*, N.Y. TIMES (Oct. 4, 2024), <https://www.nytimes.com/2024/10/04/us/joe-d-bryan-dead.html> [<https://perma.cc/NCN2-F79S>].

3. Firearms Identification Techniques

Firearms identification is “the practice of investigating whether a bullet, cartridge case or other ammunition component or fragment can be traced to a particular suspect weapon.”²⁵³ The basic idea is that (1) features unique to the interior of any particular firearm leave unique, microscopic patterns and marks on bullets and cartridge cases that are fired from that firearm, so (2) by comparing patterns and marks left on bullets and cartridge cases found at a crime scene (“unknown samples”) to marks left on bullets and cartridge cases fired from a known firearm (“known samples”), firearms examiners can determine whether the unknown samples were or were not fired from the known firearm.²⁵⁴

Firearms identification has existed as a field for more than a century. Throughout most of that time, it has been accepted by law enforcement organizations and courts without significant challenge. However, the advent of *Daubert*, work exposing the unreliability of other previously accepted forensic techniques, and recent reports questioning the foundations underlying firearms identification have led to greater skepticism.²⁵⁵

This technology has recently been questioned by state appellate courts. In *Abruquah v. State*, the Supreme Court of Maryland reviewed the current state of scientific evaluation in firearms identification. The court noted that the leading methodology in the field comes from the Association of Firearm and Tool Mark Examiners (AFTE) and their Theory of Identification.²⁵⁶ This theory involves matching patterns between cartridge cases and firearms under magnification.²⁵⁷ A given examiner then decides that there either is or is not a match between two or more “contour patterns” in the samples.²⁵⁸ This determination is necessarily subjective in nature, which has resulted in challenges.

The *Abruquah* court reviewed reports critical of the field issued since 2008.²⁵⁹ The NAS’s foundational 2009 report criticized the AFTE theory, indicating that it lacked specificity, and produced results that were not in line with the scientific method.²⁶⁰ After an exhaustive review of other reports, numerous empirical studies, recent caselaw, and the evidence presented at trial, the Supreme Court of Maryland reviewed the trial court’s decision, and granted the defendant a new trial. The court held that the state

²⁵³ *Fleming v. State*, 1 A.3d 572, 586 (Md. Ct. Spec. App. 2010).

²⁵⁴ *Abruquah v. State*, 296 A.3d 961, 968 (Md. 2023).

²⁵⁵ *Id.* at 976.

²⁵⁶ *Id.* at 974–75.

²⁵⁷ *Id.* 973–74.

²⁵⁸ *Id.* at 975.

²⁵⁹ *See id.* at 976–83.

²⁶⁰ NAT’L ACAD. OF SCI., *supra* note 62, at 6, 63–64, 155. The field was found to be “producing results that are not shown to be accurate, repeatable, and reproducible; lacking databases and imaging that could improve the method; having deficiencies in proficiency training; and requiring examiners to offer opinions based on their own experiences without articulated standards.” *Abruquah*, 296 A.3d at 977.

examiner should not have been permitted to offer an unqualified opinion that the crime scene bullets were fired from Mr. Abruquah's gun. The reports, studies, and testimony presented to the circuit court demonstrate that the firearms identification methodology employed in this case can support reliable conclusions that patterns and markings on bullets are consistent or inconsistent with those on bullets fired from a particular firearm. Those reports, studies, and testimony do not, however, demonstrate that that methodology can reliably support an unqualified conclusion that such bullets were fired from a particular firearm.²⁶¹

4. *Dog Sniffs*

K9 Units are often dispatched in law enforcement; they have been used to track suspects, find missing people, and to determine whether someone might be carrying drugs. But their use has come into question due to studies that have questioned the field's efficacy. In 2011, the Australian government launched a study of over 14,000 searches where a dog indicated that a person was carrying drugs.²⁶² In over 11,000 of those cases, no drugs were found, resulting in a false positive rate of over seventy percent.²⁶³ In another study, the Chicago Tribune looked at three years' worth of cases in which law enforcement used dogs to sniff out drugs and cars in suburban Chicago.²⁶⁴ The researchers found that in only forty-four percent of cases in which dogs alerted them to the presence of drugs were drugs or paraphernalia found on suspects.²⁶⁵ In this study, there also seemed to be a correlation with the race of the defendant; when the driver was Latino, the dogs were right only twenty-seven percent of the time.²⁶⁶

The Chicago study, however, went one step farther, and spoke to canine experts who almost universally blamed the handlers:

Dog handlers can accidentally cue alerts from their dogs by leading them too slowly or too many times around a vehicle, said Lawrence Myers, an Auburn University professor who studies detector dogs . . . Training is the key to eliminating accidental cues and false alerts, said Paul Waggoner of Auburn's detector-dog research program.²⁶⁷

²⁶¹ Abruquah, 296 A.3d at 968.

²⁶² Anna Patty, *Sniffer dogs get it wrong four out of five times*, THE SYDNEY MORNING HERALD (Dec. 12, 2011), <https://www.smh.com.au/environment/conservation/sniffer-dogs-get-it-wrong-four-out-of-five-times-20111211-1opr.html> [https://perma.cc/JV2L-6GVL].

²⁶³ *Id.*

²⁶⁴ Eyder Peralta, *Report: Drug-Sniffing Dogs Are Wrong More Often Than Right*, NPR (Jan. 7, 2011), <https://www.npr.org/sections/thetwo-way/2011/01/07/132738250/report-drug-sniffing-dogs-are-wrong-more-often-than-right> [https://perma.cc/PNJ2-R7FX].

²⁶⁵ *Id.*

²⁶⁶ *Id.*

²⁶⁷ *Id.*

Whether due to poor handling or garden variety inaccuracy, the practice seems to have limited efficacy in law enforcement use.

5. *Hair and Fiber Evidence*

In rural Stoughton, Wisconsin, in 1987, a twenty-eight-year-old mother of two was raped by a stranger in her home.²⁶⁸ Nearly two years later, Richard Beranek, who was living 130 miles away and had no known ties to the community, surfaced as a suspect based on his resemblance to a composite sketch of the perpetrator.²⁶⁹ At his trial, an FBI analyst testified that a hair found in the victim's underwear matched the defendant to a high degree of probability.²⁷⁰ Even though multiple witnesses testified he was hundreds of miles away at the time of the rape, he was found guilty on nine felony counts after a jury trial and sentenced to 243 years in prison.²⁷¹

Unfortunately for Beranek, and for many other defendants, he sat in prison for twenty-seven years until later DNA analysis excluded him as the source of the hair left at the scene.²⁷² His case is among an estimated 3,000 cases slated for reexamination due to FBI hair or fiber analysis used before DNA testing was widely available.²⁷³ This review, conducted in 2015, was a joint project between the FBI, the Innocence Project, the Department of Justice, and the National Association of Criminal Defense Lawyers.²⁷⁴ The project determined that in at least ninety percent of trial transcripts, examiners testifying to hair and fiber evidence made erroneous statements or submitted erroneous laboratory reports.²⁷⁵ In many cases "FBI microscopic hair analysts committed widespread, systematic error, grossly exaggerating the significance of their data under oath with the consequence of unfairly bolstering the prosecutions' case."²⁷⁶ Of the 3,000 reviewed cases, the majority were taken to trial, and at least thirty-five defendants received the death penalty.²⁷⁷ In light of the review's findings, the FBI committed to an independent investigation of FBI laboratory protocols, additional review of cases, and to encouraging independent state review.²⁷⁸

²⁶⁸ Dee J. Hall, *Innocent People Convicted from Flawed Hair Evidence*, POST CRESCENT (Apr. 30, 2017), <https://www.postcrescent.com/story/news/investigations/2017/04/30/innocent-people-convicted-flawed-evidence/100974186/> [<https://perma.cc/NL2H-XZNS>].

²⁶⁹ *Id.*

²⁷⁰ *Id.*

²⁷¹ *Id.*

²⁷² *Id.*

²⁷³ *FBI Testimony on Microscopic Hair Analysis Contained Errors in at Least 90 Percent of Cases in Ongoing Review*, FBI News (Apr. 20, 2015), <https://www.fbi.gov/news/press-releases/fbi-testimony-on-microscopic-hair-analysis-contained-errors-in-at-least-90-percent-of-cases-in-ongoing-review> [<https://perma.cc/W92C-5ZEX>].

²⁷⁴ *Id.*

²⁷⁵ *Id.*

²⁷⁶ *Id.*

²⁷⁷ *Id.*

²⁷⁸ *Id.* See also *United States v. Nelson*, 217 A.3d 717 (D.C. 2019) (vacating convictions where a government hair expert provided false and misleading testimony; the court emphasized that the evidence was central to the prosecution's theory and not harmless beyond a reasonable doubt); *Jones v. United States*, 202 A.3d 1154 (D.C. 2019) (vacating convictions because the

B. The Effects of Junk Science on Convictions

In all these cases, police officers provided evidence, either through a trial or before a plea, that appears scientific in nature but was ultimately less than scientific in methodology. And in most of these cases, the police officer witness had no more training than a short course in the discipline taught by another police officer. There was no requirement for credentialing²⁷⁹ by degree or other standard, and the courses were typically one week or shorter. There is significant evidence that invalid forensic science like that discussed here leads to erroneous convictions, whether in a trial or before a guilty plea. In *Invalid Forensic Science Testimony and Wrongful Convictions*,²⁸⁰ Brandon Garrett and Peter Neufeld present the first study exploring how often forensic science testimony by state experts factors into the trials and ultimate convictions of the innocent. In their study, the authors reviewed transcripts for the trials of 137 people who had been convicted but ultimately exonerated by DNA evidence.²⁸¹ The evidence in these trials commonly included testimony concerning hair comparison and blood analysis, but some included bite mark testimony and fingerprint and shoe print comparisons.²⁸² The study found that in most of the trials of these innocent defendants, upwards of sixty percent of the forensic analysts who were called by the state at trial provided invalid testimony.²⁸³ In many cases, officers testified to conclusions that misstated empirical data, or those that were wholly unsupported by data.²⁸⁴ In most of these cases, there was virtually no oversight of the “science,” in that defense counsel rarely cross-examined the state witnesses or presented experts of their own.²⁸⁵ Even in those cases where the forensic science was challenged, judges rarely provided relief in terms of excluding the evidence.²⁸⁶ Thus, while the option to review scientific evidence remains a valid one at trial, it rarely results in the exclusion of evidence.

Further, John Morgan examined 1,391 forensic examinations and concluded that most errors related to forensic science are frequently associated with miscommunicating results, not conforming to established standards, or

prosecution presented false or misleading expert testimony on microscopic hair comparisons, violating due process; the court emphasized that the expert’s testimony had been powerful and improperly linked the defendant to the crime); *Martin v. State*, 2018 Ark. 344 (Ark. 2018) (allowing reinvestment of jurisdiction for coram nobis review, noting errors in the expert’s testimony that paralleled flaws identified in national FBI reviews, including statistical exaggerations).

²⁷⁹ There is some evidence that even credentials might not be enough to ensure scientific reliability. See generally Brandon Garrett & Gregory Mitchell, *The Proficiency of Experts*, 166 U. PA. L. REV. 901 (2018) (reviewing credentialing in finger print analysis and finding an incredibly high rate of false positive identification, even when the officers had an established credential).

²⁸⁰ Brandon Garrett & Peter Neufeld, *Invalid Forensic Science Testimony and Wrongful Convictions*, 95 VA. L. REV. 1 (2009).

²⁸¹ *Id.* at 9.

²⁸² *Id.*

²⁸³ *Id.* at 14.

²⁸⁴ See *id.* at 74.

²⁸⁵ *Id.* at 6, 10.

²⁸⁶ *Id.* at 33.

failing to provide appropriate limiting information.²⁸⁷ Morgan notes that “the misapplication of forensic science has been associated with a significant fraction of wrongful convictions in the United States,”²⁸⁸ and indicates that his work is designed to determine what specific kinds of errors are at fault. In approximately half of the wrongful convictions he studied, “improved technology, testimony standards, or practice standards may have prevented a wrongful conviction at the time of trial.”²⁸⁹ Thus, his work shows that a significant number of errors in forensic testimony that convict innocent people are not then due to unscrupulous examiners or corruption in the system but are directly attributable to the lack of scientific or technical ability of the people that testify.

If trials have little chance of addressing the issue of scientific reliability, guilty plea hearings have almost no chance of doing so. In each of the cases discussed herein, defendants had legitimate arguments that the science convicting them was inaccurate at best and fabricated at worst. For those defendants who went to trial, they at least had a mechanism for appeal in which higher courts could review issues of scientific reliability. But for those defendants who took a plea, like Angela Garcia after her third trial, there was absolutely no mechanism by which they could have review of any of the hard sciences that were used to provide evidence against them. This is what needs to change.

Because the American criminal justice system literally requires such an incredibly high percentage of guilty pleas, and because the consequences of evolving science are particularly great for pleas, the plea system itself can and should change. Not only are trial court judges well suited to respond to this pressing issue, but they can also accomplish true progress without substantially involving any other aspect of the justice system. They need no legislative support, no extralegal support, and, not insignificantly, no funding, to safeguard the system against the reach of pseudoscience.

III. THE PLEA COLLOQUY SCOPE AND PROCESS

While (and perhaps because) guilty pleas remain crucial to the criminal justice system, several constitutional and procedural protections exist to protect defendants both in the federal and in all state systems. These protections create a scaffolding for the introduction of scientific reliability at the colloquy, and the procedure allows for easy and efficacious inclusion of language that might benefit thousands of defendants.

Guilty pleas are the most common way cases are disposed of in both state and federal courts. “Plea bargaining has been a constitutionally recognized

²⁸⁷ John Morgan, *Wrongful Convictions and Claims of False or Misleading Forensic Evidence*, 68 J. FORENSIC SCI. 908 (2023).

²⁸⁸ *Id.* at 909. Morgan gleaned this data from the Innocence Project’s review of wrongful convictions. See also Emily West & Vanessa Meterko, *Innocence Project: DNA Exonerations, 1989–2014: Review of Data and Findings from the First 25 years*, 79 ALB. L. REV. 717 (2016).

²⁸⁹ Morgan, *supra* note 287, at 908.

part of the American criminal legal system for over 50 years. Upwards of 95% of criminal cases at the federal and state levels terminate in guilty pleas, many of which are secured through negotiations between the prosecution and the defense.”²⁹⁰ Professor Dan Canon discusses the magnitude of the plea system in America in his book, *Pleading Out: How Plea Bargaining Creates a Permanent Criminal Class*:

Today, with the full blessing of the courts, plea bargaining is the primary way—indeed, almost the *only* way—in which criminal cases are resolved in the United States. . . . We like to think of our justice system as revolving around the jury trial. In fact, trials in America are practically extinct. Somewhere around 97% of US criminal convictions are by guilty plea, and the vast majority of those are result of a plea bargain. Most judges now believe that plea bargaining is, “not only an essential part of the process, but a highly desirable part. . . .” As one Supreme Court justice wrote, “To a large extent . . . horse trading determines who goes to jail and for how long. That is what plea bargaining is. It is not some adjunct to the criminal justice system; it *is* the criminal justice system.”²⁹¹

Canon goes on to describe the “breakneck speeds” at which the bargaining process occurs, calling plea negotiations “rocket dockets” and “plea blitzes,” at which high numbers of convictions can be ensured in an hour or two, with “files . . . barely cracked and allegations barely read.”²⁹² He details the standard process: “prosecutors offer a deal, defense attorneys counter offer, the lawyers go back and forth until the price is right and defendants plead guilty. All without anyone knowing much of anything about the case at all.”²⁹³

When a defendant wants to plead guilty to a crime in the United States, the court must be certain that he understands the consequences of his guilty plea, both to protect his rights and so that the plea cannot be later attacked on appeal. The Supreme Court has held that guilty pleas must be voluntarily and knowingly made and has determined that defendants may only plead guilty if they know the direct consequences of the plea, like the potential sentence and appealability. Specifically, a guilty plea that can withstand constitutional scrutiny must be (1) “knowing[,] that is, the defendant understands the rights being waived and the consequences of their waiver; (2) the plea is voluntary[,] that is, the plea ‘did not result from force, threats, or promises (other than promises in a plea agreement)’; and (3) that the plea has a factual basis.”²⁹⁴

Once the parties agree on the details of the plea, it is reduced to writing and entered on the record in court. “This tends to be a standardized process,

²⁹⁰ Dylan R. McDonough, *In the Shadow of the Bench: Judicial Discretion to Reject Plea Agreements*, 57 COLUM. J.L. & SOC. PROBS. 633, 635 (2024).

²⁹¹ CANON, *supra* note 31, at 16.

²⁹² *Id.* at 7.

²⁹³ *Id.*

²⁹⁴ McDonough, *supra* note 290 at 641. This specific requirement is found in FED. R. CRIM. P. 11.

with procedural rules providing a checklist of factors to move through.”²⁹⁵ Federal Rule of Criminal Procedure 11 and most state rules require the court to engage in what is typically called a “plea colloquy”²⁹⁶ with the defendant. This colloquy typically involves the trial court judge asking a pre-prepared series of questions to the defendant and seeking his answers on the record. Rule 11 requires the plea colloquy to include at minimum the following inquiries:

Before the court accepts a plea of guilty or nolo contendere, the defendant may be placed under oath, and the court must address the defendant personally in open court. During this address, the court must inform the defendant of, and determine that the defendant understands, the following:

- (A) the government’s right, in a prosecution for perjury or false statement, to use against the defendant any statement that the defendant gives under oath;
- (B) the right to plead not guilty, or having already so pleaded, to persist in that plea;
- (C) the right to a jury trial;
- (D) the right to be represented by counsel—and if necessary have the court appoint counsel—at trial and at every other stage of the proceeding;
- (E) the right at trial to confront and cross-examine adverse witnesses, to be protected from compelled self-incrimination, to testify and present evidence, and to compel the attendance of witnesses;
- (F) the defendant’s waiver of these trial rights if the court accepts a plea of guilty or nolo contendere;
- (G) the nature of each charge to which the defendant is pleading;
- (H) any maximum possible penalty, including imprisonment, fine, and term of supervised release;
- (I) any mandatory minimum penalty;
- (J) any applicable forfeiture;
- (K) the court’s authority to order restitution;
- (L) the court’s obligation to impose a special assessment;
- (M) in determining a sentence, the court’s obligation to calculate the applicable sentencing-guideline range and to consider that range, possible departures under the Sentencing Guidelines, and other sentencing factors under 18 U.S.C. § 3553(a); and

²⁹⁵ *Id.* at 641–42.

²⁹⁶ This may also be called an “allocution.” *See, e.g.,* United States v. Kim, 71 F.4th 155, 168 (4th Cir. 2023).

- (N) the terms of any plea-agreement provision waiving the right to appeal or to collaterally attack the sentence; and
- (O) that, if convicted, a defendant who is not a United States citizen may be removed from the United States, denied citizenship, and denied admission to the United States in the future.²⁹⁷

This process is designed to ensure that the constitutional imperative of a voluntary and knowing plea is upheld—but much like a *Miranda* warning, no specific language is required.²⁹⁸ The Fourth Circuit has described the process thusly: “When determining whether a plea hearing complies with the requirements of Rule 11, we are obligated to accord deference to the trial court’s decision as to how best to conduct the mandated colloquy with the defendant.”²⁹⁹ In this colloquy, the trial court is tasked with providing notice of a defendant’s constitutional rights with some level of clarity, but not with extreme precision. Any errors rarely result in the withdrawal of a plea. The Supreme Court has determined that only a select few errors belong to the “highly exceptional category of structural errors” that can justify withdrawing a guilty plea.³⁰⁰ The “very limited” class of errors that can justify overturning a conviction based on a guilty plea “include the denial of counsel, denial of self-representation, denial of a public trial, and a defective reasonable-doubt instruction—errors so intractably disruptive to the defendant’s constitutional trial rights that they affect the entire conduct of the [proceeding] from beginning to end.”³⁰¹

The rest of the details, however, are left to the court—the language of the required advisements, whether to have a conversation back and forth with the defendant or to let him confer with counsel, whether there are any additional warnings the court decides to give.³⁰² Only once this colloquy is complete, and the court is satisfied that it shows the voluntariness of the knowing plea, may the court accept it. Of course, the acceptance of a guilty plea must follow these constitutional and procedural standards, but the process in which it is bargained for primes the system to accept evidence at face value without a significant inquiry into the adequacy of any scientific or quasi-scientific claims. This is not sustainable, ethical, or logical in a system based on proof and on convictions beyond a “reasonable” doubt.

²⁹⁷ FED. R. CRIM. P. 11(b)(1).

²⁹⁸ See *Miranda v. Arizona*, 384 U.S. 436, 490 (1966) (“[T]he Constitution does not require any specific code . . .”).

²⁹⁹ *Kim*, 71 F.4th at 165.

³⁰⁰ *United States v. Davila*, 569 U.S. 597, 599 (2013).

³⁰¹ *United States v. Umeh*, 132 F.4th 573, 580 (2025) (citing *Greer v. United States*, 593 U.S. 503, 513 (2021)) (internal citations omitted).

³⁰² One warning that judges may ask defendants in the colloquy process is whether they are satisfied with the representation of counsel. This warning attempts to protect the defendant against substandard representation, but it might protect practitioners from subsequent malpractice cases even more. See, e.g., *Ramos v. United States*, No. 23-14247-CIV-CAN, 2024 U.S. Dist. LEXIS 77697, at 19 (S.D. Fla. Apr. 26, 2024) (“Movant made sworn statements at the plea colloquy that he understood the charges against him; that counsel had reviewed defenses with him and the case in general; and that he was fully satisfied with the representation of counsel.”).

Both defense counsel and the court are charged with ensuring that these constitutional protections are enforced to protect the defendant; as far back as 1938, the Supreme Court in *Johnson v. Zerbst* held that it is not only the duty of defense counsel to protect the rights of the accused but that the constitutional right of representation “[i]nvolves, of itself, the protection of a trial court . . . [t]his protecting duty imposes the serious and weighty responsibility upon the trial judge of determining whether there is an intelligent and competent waiver [of a jury trial] by the accused.”³⁰³ In addition, it is the trial court and the trial court alone that can decide whether to even take a plea agreement at all. Even in cases where both the state and the defendant want a case to plead, a trial court can reject their agreement and force the parties to renegotiate or for the matter to go to trial. As the Supreme Court has noted, “[a] criminal defendant does not have an absolute right under the Constitution to have his guilty plea accepted by the court . . . although the States may by statute or otherwise confer such a right.”³⁰⁴ Typically, criminal procedure rules specifically give trial courts discretion over when and whether to accept a defendant’s guilty plea as there is no constitutional right to plead guilty.³⁰⁵ However, even in states that do confer such a right, it only extends to the defendant’s right to plead guilty, not to enter a plea agreement.³⁰⁶

In federal court, Rule 11 also governs the acceptance or rejection of a plea agreement; it provides “[t]o the extent the plea agreement is of the type specified in Rule 11(c)(1)(A) or (C),³⁰⁷ the court may accept the agreement, reject it, or defer a decision until the court has reviewed the presentence report.”³⁰⁸ Under Rule 11, “[a] district court enjoys broad discretion . . . to reject a plea agreement . . . [and] does not abuse its discretion when it rejects a plea agreement because the agreement does not adequately reflect the seriousness of the defendant’s offense conduct.”³⁰⁹ “Nor does a district court abuse its discretion when it rejects a plea agreement because the agreement will result in a sentence that is too lenient under the circumstances.”³¹⁰

These pleas can take many different forms. Prosecutors often use colloquialisms for all the different types; a plea of guilty without an agreement might be called a “straight up,” an “open,” or a “chips” plea. Open pleas allow the court to sentence a defendant to a variety of potential terms, as opposed to

³⁰³ *Johnson v. Zerbst*, 304 U.S. 458, 465 (1938).

³⁰⁴ *North Carolina v. Alford*, 400 U.S. 25, 38 (1970).

³⁰⁵ See, e.g., H. Mitchell Caldwell and Anthony X. McDermott, *A Life in the Balance: Is There a Right to Plead Guilty Even If It Is to Avoid the Death Penalty?*, 104 Dick. L. Rev. 409 (2000).

³⁰⁶ See *id.* for an example of how California statutes discuss this right in the context of a capital murder case.

³⁰⁷ Section A describes charge or count bargaining, where the government agrees to dismiss or not bring other charges. Section C describes a sentencing cap or an agreed-upon sentence. Section B describes sentencing that does not bind the court—thus, one that is not fundamentally different from an open plea. It may contain a sentencing recommendation, but not a formal agreement. FED. R. CRIM. P. 11.

³⁰⁸ *Id.*

³⁰⁹ *United States v. Darnelle Young*, No. 23-12921, 2024 U.S. App. LEXIS 28184, at *3 (11th Cir. Nov. 6, 2024).

³¹⁰ *Id.* (citing *United States v. Bean*, 564 F.2d 700, 704 (5th Cir. 1977)). This precedent relies heavily on *Santobello v. New York*, which held that “a court may reject a plea in exercise of sound judicial discretion.” 404 U.S. 257, 262 (1971).

a plea bargain, which often included dropped charges, agreed-upon sentences, or sentence caps.³¹¹ While it is not often that a court rejects an open plea,³¹² courts have “wide latitude” to accept or reject plea agreements and do reject them more often based on the potential sentence.³¹³ In *Michael Flynn and Motions to Dismiss in Tennessee Agreed Dismissal—Who Can Complain?*, Wade Davies summarizes the landscape:

What happens . . . often is for a trial court to reject a plea agreement that the state has offered. This does not implicate separation of powers nearly as much as the decision about whether to prosecute or dismiss a case because sentencing is traditionally a judicial function. Still, there are limits on when a trial court can reject a plea agreement. A trial judge must evaluate the facts of the particular case and exercise discretion using sound legal principles. In exercising discretion on a plea agreement, however, the trial court has the authority to take into account what the judge thinks the fair result should be. There is no requirement that the state is operating in bad faith. The trial court, for example, can reject a plea agreement because the punishment is too lenient.³¹⁴

In *In the Shadow of the Bench: Judicial Discretion to Reject Plea Agreements*, Dylan McDonough argues that the judicial discretion to reject a plea is perhaps the only power courts have in the process: in federal courts and in at least 14 states, judges are barred from participating in plea negotiations by statute, procedural rule, court rule, or case law.³¹⁵ In those jurisdictions, judges have one tool for oversight: judicial discretion to reject plea agreements.³¹⁶ McDonough goes on to argue that judges should utilize this power more often, contending that Rule 11 fails to provide guidelines for the court in considering whether to accept or reject the agreement: “Instead, the federal rules have left it to the courts to develop their own criteria for determining whether to accept or reject a proposed plea agreement.”³¹⁷ Because appellate “[c]ourts have failed to clarify the nature of the discretion granted to them in these procedural rules,” trial judges reject plea agreements for a wide variety of reasons

³¹¹ This is short for “let the chips fall where they may.” See *Randall v. State*, No. 20A03-0711-CR-538, 2008 Ind. App. Unpub. LEXIS 685 (Ct. App. Feb. 29, 2008). (“[P]ublic defender responded affirmatively when the court asked, ‘This is a chips plea?’ The court was also informed that the State did not offer a plea agreement...” (citation modified)). See also *United States v. Perdue*, 110 F.4th 662, 671 (4th Cir. 2024) (“Perdue made a voluntary decision to plead straight up to the indictment. Perdue rejected his counsel’s advice to consider accepting a plea agreement...”); *People v. Henderson*, 282 Cal. Rptr. 3d 538 (2021) (discussing an “open plea”).

³¹² Under Fed. R. Crim. P. 11(c)(1)(B), the court must accept pleas that are mere sentence recommendations, and not agreements.

³¹³ See, e.g., *United States v. Jimenez-Hernandez*, No. 24-5060, 2024 LEXIS 32910 (10th Cir. Dec. 31, 2024); see also McDonough, *supra* note 290, at 660 (“The most common consideration trial courts cite when rejecting an agreement is the sentence contemplated by the agreement. Trial courts frequently reject plea agreements as too lenient.”).

³¹⁴ Wade Davies, *Crime & Punishment: Michael Flynn and Motions to Dismiss in Tennessee Agreed Dismissal—Who can complain?*, 56 TENN. B.J. 34, 35 (2020).

³¹⁵ McDonough, *supra* note 290 at 649–50.

³¹⁶ *Id.*

³¹⁷ *Id.* at 643.

“without any unifying theory;” these decisions generally hold up on appeal.³¹⁸ For example, judges have rejected certain pleas out of hand, stating they just “don’t waive firearms enhancements . . . you plead them, they’re stuck,”³¹⁹ some reject ordinary stipulated sentences,³²⁰ others are flatly rejected in the “public interest,”³²¹ and some judges simply reject a sentence as too lenient—the most common consideration, and one with a specific legal basis in the rules.³²²

Because courts have the responsibility to advise defendants in open court of their charges, to ensure that any plea they give is voluntary and knowing, and possess wide latitude to accept or reject any plea agreement, they also have the ability to reject a plea agreement that is not based on solid scientific evidence. In *Daubert*, the Supreme Court was clear that the rules of evidence “assign to the trial judge the task of ensuring that an expert’s testimony both rests on a reliable foundation and is relevant to the task at hand.”³²³ This happens with some regularity at trial—before scientific evidence is presented, many courts conduct *Daubert* hearings to determine whether an expert’s testimony is admissible.³²⁴ But during most plea negotiations, the court and defense counsel and her client are often most concerned with the clear and direct consequences of the plea: how long will he be incarcerated, and how will the conviction affect his future? In many cases, however, the biggest issue in a defendant’s case and what drives the plea negotiations is the strength of the evidence against him.

Such wide latitude to accept or reject a plea coupled with the court’s responsibility to protect a criminal defendant’s rights, including the scientific efficacy of the evidence, creates the perfect storm—one in which updates to the process are within the control of one member of the system. Should a trial court wish to update standards for a plea, they need ask no permission of the legislature and need not wait for reform to take place outside of their courtroom. Thus, they can effect change efficiently, effectively, and at no expense to the jurisdiction, financial or otherwise.

³¹⁸ *Id.* at 659.

³¹⁹ *State v. Montiel*, 122 P.3d 571, 574 (Utah 2005). In *Montiel*, the trial court rejected a plea agreement, stating that they would not allow any pleas on firearm enhancements unless there was a mistake in pleading. *Id.* at 574. After being convicted by a jury, the defendant appealed the rejection of the guilty plea. *Id.* The decision was upheld on appeal, as the court acted “well within the bounds of reason” in rejecting the plea. *Id.* at 581.

³²⁰ *E.g.*, *In re Morgan*, 506 F.3d 705, 708 (9th Cir. 2007). While the District Court did overturn this rejection based on a lack of individualized consideration, it did not wholly reject the rationale that judges could reject a stipulated sentence on a case-by-case basis. *See id.* at 709 (“Rule 11 clearly vests district courts with the discretion to accept or reject plea agreements. . .”).

³²¹ *See United States v. Walker*, 922 F.3d 239, 245 (4th Cir. 2019), *vacated by*, *Walker v. United States*, 589 U.S. 1042 (2019). In *Walker*, the court rejected a fentanyl distribution agreement due to the cultural context of the opioid crisis, among other things. *Id.* The decision was upheld by the Fourth Circuit. *Id.* at 248–52.

³²² *See McDonough*, *supra* note 316. Other reasons to reject a plea agreement include public interest, victims’ rights, legislative intent, views of law enforcement, and other rarer reasons. *Id.*

³²³ *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 598 (1993).

³²⁴ *See* ROBERT E. LARSEN, NAVIGATING THE FEDERAL TRIAL § 11:26 (2025).

IV. ADJUSTING THE PLEA COLLOQUY: PROFFERS AND LINGUISTIC UPDATES

Adjusting the plea colloquy to establish scientific reliability could take shape in one of two ways; first, via a proffer by the state. Should the state offer such an evidentiary proffer in the plea process, the proof might protect defendants when that evidence later turns out to be "junk science." Establishing a record as to what the defendant and his counsel were advised about the science at the time of the plea could help protect him should the basis for the scientific evidence change; in pleading guilty, the defendant relied on this proffer and on the strength of the scientific evidence the state had against him, even if he was not fully equipped to understand it. At minimum, the rules of criminal procedure can allow a hearing based on the voluntariness of the plea, not just on the actual innocence of the defendant. These hearings, based on the evolution of scientific inquiry, have the potential to right system wrongs, and the plea colloquy preserves the argument for appeal or for post-conviction relief. Without it, the defendant simply takes the state's evidence at face value and acknowledges that it is sufficient without further inquiry.

But what would such a scientific proffer look like in open court? Because the question of the language in a plea colloquy is up to the trial court, the judge has wide deference to accept a variety of different proffers. Requiring a proffer to have some indicia of scientific reliability would not be difficult; of course, a prosecutor could call an expert witness to lay the basis for scientific reliability at a plea hearing. But as a prosecutor typically simply types up a summary of the evidence or orally states it on record in open court to establish the factual basis for the plea, it could also be as simple as the prosecutor stating the scientific basis for the evidence in the colloquy, or by providing a scientific journal or an article discussing the basis of the scientific methodology. This would, at minimum, establish some sort of reasonable basis that the court and a defendant might later rely on to ensure that his conviction is sound.

The second option to protect the scientific integrity of the plea is through changes to the language of the colloquy itself and could include a dialogue between the court and the defendant on the scientific evidence at hand. A potential change to the plea colloquy should include questions that directly address the changing nature of science and the potential for erroneous pleas based on evidence that might change in relevance over time. For courts that want to include such inquiry in colloquies, questions should appropriately address disclosure, advice, and the preservation of evidence without forestalling a defendant's ability for further address should the science change. In short, questions should aim to protect a defendant and ensure the integrity of scientific inquiry, not just memorialize the pseudo-science available at the date of the plea. Courts can and should adjust their plea colloquies using language that accomplishes this goal.

A. Disclosure of Scientific Evidence

A defendant has the right to know what the evidence is against him. As such, if that evidence is scientific in nature, they have the right to understand not only what the evidence proves in the trial, but how reliable and effective it may be. The plea colloquy should reflect that with the following questions:

1. Has the prosecution informed you and your attorney that this case involves evidence or testimony that relies on scientific, technical, or specialized knowledge?
2. Have you reviewed all of the evidence against you, including any that relates to scientific, technical, or specialized knowledge?

B. Counsel's Advice on Reliability

In order to preserve the finality of a guilty plea, questions might also center around the explanation of scientific evidence. By inquiring as to this evidence on the record, defense counsel now has a specific duty to advise their client on any scientific or technical evidence and may also review the collateral consequences of a plea based on it. The colloquy should include questions such as:

1. Has your attorney explained to you whether the scientific or expert evidence against you has been tested for reliability, and whether there are known challenges to that type of evidence?
2. Do you understand whether the expert in your case is trained as a scientist or as a law enforcement officer with specialized training?
3. Do you understand that the reliability of scientific evidence may change over time, and that could result in changes in the strength of the evidence against you?

C. Preserving the Record on Appeal

Perhaps the most important questions that a court should ask a criminal defendant in a plea colloquy involve those that preserve his rights on appeal. There is currently no specific safeguard against the changing of scientific evidence, but if a defendant can show through answers to the questions in his plea colloquy that his plea was either not voluntary or not knowing, he could potentially later attack that plea on appeal should the reliability of the scientific evidence against him change. Because guilty pleas do not currently contain a *Daubert* or *Frye* inquiry requirement, the questions evinced at a plea

colloquy can and should use the language from those cases to establish scientific reliability for purposes of appeal through the following questions:

1. Does your plea today rely on an understanding that the scientific, technical, or specialized evidence against you is reliable and generally accepted in its field?
2. Does your plea today rely on an understanding that the scientific, technical, or specialized evidence against you is a product of the scientific method, and is testable, peer reviewed, and able to be replicated?
3. Are you pleading guilty in light of the validity of scientific evidence that exists to prove the state's case?
4. Have any promises been made to you in terms of the strength of the scientific evidence against you?

This colloquy not only protects the defendant, but the state. In cases where the scientific evidence is sound, like in a case involving DNA evidence, a defendant's guilty plea is that much more certain once he has been advised of the evidence and decides to plead guilty even in light of it.

V. THE NEED TO ENSURE SCIENTIFIC INQUIRY IN CRIMINAL PLEAS

Certainly, courts across the country are free to either include scientific proffers at a plea colloquy or to reject plea agreements that are not accompanied by significant proof that the scientific allegations contained in the colloquy are accurate. They can do so unilaterally and need no permission nor buy-in from any governing body as the matter is within their sole discretion. As it is a matter within a court's purview, such a scientific proffer is unlikely to be a source of appeal, even if a conviction might later be. This proposal is not without some scholarly support; in *Judicial Oversight of Negotiated Sentences in a World of Bargained Punishment*, Nancy King discusses that on many occasions, the relative leniency of a plea agreement is simply an outcropping of how skilled the defense attorney is at negotiation—and not whether it reflects an appropriate sentence in light of the evidence.³²⁵ Also, Congress itself, through the Sentencing Reform Act of 1984, recognized how sentencing regulations were threatened by shrewd bargaining based on considerations irrelevant to sentencing and opined that “judicial oversight [is] the most potent remedy for this threat.”³²⁶

Other scholars have discussed how the relationship between prosecutors and judges can unbalance the scales in the plea process and lead to a lack of scrutiny for police officers who testify for the state. In *Uneven Scales: How the Symbiotic Relationship Between Prosecutors and Judges Results in Unfair Criminal Proceedings*, Edward Adams describes the phenomenon that many judges are former

³²⁵ See generally Nancy King, *Judicial Oversight of Negotiated Sentences in a World of Bargained Punishment*, 58 STAN. L. REV. 293 (2005).

³²⁶ *Id.* at 294.

prosecutors—far more than those who are prior defense attorneys—and argues that “prosecutors and judges routinely work hand-in-hand to best serve their respective functions such that defendants can rarely receive a fair trial.”³²⁷ This “symbiotic relationship” results in judges who “make decisions that confirm or support prior beliefs, attitudes, or values.”³²⁸ As such, it follows that judges will typically trust a prosecutor’s assertion that the science in a given police-based field, like blood spatter or 911 call analysis, is accurate.

An overworked system in which the vast majority of cases get resolved via a guilty plea, and in which many judges have ties to prosecutors, is setting innocent defendants up for wrongful convictions. When there is not enough time on a docket to make a lengthy inquiry, and not enough time in a court schedule to conduct more than a trial a month, the system keeps hurtling defendants forward into this conveyor belt of criminal justice, where few, if any cases actually end up examining the science that puts thousands of people away. A process that allows for quick, resilient, and efficient inquiry into the science behind a conviction benefits everyone, and that process could either be accomplished by way of a brief proffer or through a few questions in a stand-and plea colloquy.

A. Safeguarding the Finality of the Guilty Plea

“Whatever might be the situation in an ideal world, the fact is that the guilty plea and the often concomitant plea bargain are important components of this country’s criminal justice system.”³²⁹ Guilty pleas allow defendants to avoid extended incarceration pretrial; they allow both defendants and victims of crimes some level of certainty as opposed to the risks that a jury trial normally is accompanied by. They save the state time, effort, and expense in litigating a case before a jury. But “these advantages can be secured, however, only if dispositions by guilty plea are accorded a great measure of finality.”³³⁰ Thus, collateral attacks on guilty pleas are rare, but are not “uniformly invulnerable to subsequent challenge.”³³¹

Because of the potential for serious harm, including wrongful executions, the system must ensure not only that the scientific evidence is good, but that it stays good over time. Otherwise, this evidence serves not to establish the truth, but a police officer’s mere perception of truth at the time of an investigation. This is especially important at a plea where the strength of the science may be reviewed later if only in limited situations. At a trial, the defendant preserves the right to appeal, at which time another court can review the admissibility of scientific evidence. But at a plea, the defendant waives that right to appeal.

³²⁷ Edward Adams, *Uneven Scales: How the Symbiotic Relationship Between Prosecutors and Judges Results in Unfair Criminal Proceedings*, 43 L. & INEQ. 105, 139 (2025) (“As of 2021, 263 federal judges used to be prosecutors. However, only 66 federal judges were criminal defense attorneys.”).

³²⁸ *Id.* at 140.

³²⁹ *Blackledge v. Allison*, 431 U.S. 63, 71 (1977).

³³⁰ *Id.*

³³¹ *Fontaine v. United States*, 411 U.S. 213, 215 (1973).

What happens to a defendant when the science changes after his plea, and functionally renders his conviction erroneous?

A defendant may collaterally attack his guilty plea if he can show that it was not given voluntarily with knowledge of the consequences.³³² In addition, unless the court record conclusively shows that a prisoner is not entitled to this kind of relief, he is entitled to a hearing on his motion.³³³ While this is the specific standard under the Federal Rules of Criminal Procedure, most states follow a similar process. For example, in New York, a prisoner may allege ineffective assistance of counsel, fraud or duress, constitutional violations, or that new evidence was discovered favorable to the defendant that would have made a difference at his trial.³³⁴ In Ohio, defendants may move to withdraw guilty pleas after sentencing with a showing of “manifest injustice.”³³⁵ Manifest injustice includes ineffective assistance of counsel, a lack of voluntariness, and the defendant not receiving the concessions agreed to in the plea. As under the federal rules, most states like Ohio require a hearing to be held once a defendant makes such allegations.³³⁶

Hearings to overturn pleas, while somewhat rare, would certainly be affected by scientific inquiry at the colloquy, both strengthening some pleas and weakening others in a profoundly just way. When a trial court inquires into the science behind a guilty plea, it necessarily makes the subsequent conviction more secure. Through a specific colloquy, the court can establish that a given defendant knew that his guilty plea is based on his understanding of the scientific evidence—this allows for less surprise later should the conviction actually be based on solid scientific proof. The only pleas that are “less secure” are those that should not have been guilty pleas in the first place—those based on shoddy or inadequate evidence. Inquiry into the science at a guilty plea, then, only weakens the power of the pleas that should have been dismissals, yet strengthens those based on good science.

B. Educating the Court about the Importance of a Scientific Basis for Guilty Pleas

The legal system has concerned itself with scientific reliability for decades—in *Daubert*, the Supreme Court:

set forth several factors for judicial consideration in evaluating admissibility of scientific evidence. Under *Daubert* factors, expert

³³² 28 U.S.C. § 2255(a). The statute provides that federal prisoners claiming a constitutional or other violation, including the voluntariness requirement of Rule 11, may move the court to vacate, set aside, or correct a sentence. FED. R. CRIM. P. 11.

³³³ 28 U.S.C. § 2255(b).

³³⁴ N.Y. CRIM. PROC. LAW § 440.10.

³³⁵ OHIO CRIM. R. 32.1.

³³⁶ *Id.* See also *State v. Dajuan L. Banks*, 2022-Ohio-1463 (Ct. App. 2022). “This term (manifest injustice) has been variously defined, but it is clear that under such standard, a post-sentence withdrawal motion is allowable only in extraordinary cases. A motion made pursuant to Crim.R. 32.1 is addressed to the sound discretion of the trial court, and the good faith, credibility and weight of the movant’s assertions in support of the motion are matters to be resolved by that court.”

opinion is admissible when supported by particular grounds for the expert's scientific conclusion. . . . The United States Supreme Court further clarified that an expert must "employ in the courtroom *the same level of intellectual rigor that characterizes the practice of an expert in the relevant field.*"³³⁷

Many states have also codified *Daubert* factors in their evidence rules, which reflect similar relevant factors.³³⁸

Daubert hearings are an important tool to protect the integrity of evidence, and the stakes for them are high: failure to meet *Daubert* standards can result in dismissal or severe limitations on evidence submitted to the jury.³³⁹ But these hearings are largely a function of trial—in most guilty pleas, there is no inquiry into the reliability of the scientific evidence of a given case. As ninety-seven percent of cases never see a trial, judges who rarely make inquiries into scientific fields may be apt to accept the testimony of *some* expert, in whatever form, as *the* expert in a particular field. For example, general police training does not cover scientific topics such as fluid viscosity—the resistance of a fluid against flow.³⁴⁰ But how can a forty-hour training course educate them in this, plus fluid viscoelasticity, which is specific to blood products and has a direct impact on how blood functions—a concept central to the field of blood pattern analysis? This level of depth is appropriate for study by physicians and biochemical engineers; is it part of a police expert's forty hours?

Or should it be? What are the proper parameters to judge whether a smear of red on a victim's neck is the result of blowback from a gunshot or castoff from the knife in their own hand? Or whether it is blood at all? Only a court is charged with determining what is allowable in trial to prove any of this—and this scientific evidence can be the literal difference between life and death for the accused. Judges should have some familiarity with scientific methodology in order to make these legal determinations. Of course, they can educate themselves through study and continuing judicial education. But having more opportunities to review scientific evidence during the course of a plea makes sense, and it sets the court up well to review it at *Daubert* hearings, too. Through the process of scientific plea review, both in the colloquy and at hearings when science is later exposed as inaccurate, judges will become more comfortable with issues of scientific reliability as they start examining

³³⁷ Jennifer Engelhardt & Chad Engelhardt, *Daubert Challenges to Expert Testimony: Legal Overview and Best Practices*, 101 MICH. B.J. 34, 34 (2022) (emphasis added). It is important that *Daubert* requires "intellectual rigor" relative to an expert in the field in question. Certainly, training to become a police officer doesn't have the same intellectual rigor as the scientists in the fields in which they routinely testify.

³³⁸ See, e.g., M.C.L. § 600.2955.

³³⁹ See Engelhardt, *supra* note 337, at 34.337.

³⁴⁰ This is different from fluid viscoelasticity, which is the elastic property that red blood cells possess as they interact with one another. This article does not argue that viscoelasticity is important to pattern analysis, it merely acknowledges that blood is unique; physicians and biochemical engineers study it. Do the police? See Marko Oydanich et al., *Clarification on viscosity vs. viscoelasticity*, 55 ANAESTHESIOLOGY INTENSIVE THER. 313–14 (2023) [doi: 10.5114/ait.2023.132522].

such data more often, leading to stronger evidentiary reliability throughout the system.

C. Protecting Defendants Beyond the Often-Unavailable *Alford* Plea

There is a mechanism for defendants who wish to challenge the admissibility of scientific or other evidence and still get the benefit of plea negotiations—the *Alford*³⁴¹ plea. An *Alford* plea allows a defendant to take the benefit of a guilty plea without admitting guilt—instead, he must acknowledge that there is evidence against him to prove the charges, but that he does not wish to go to trial.³⁴² This allows the defendant to get the bargain of a set sentence or a dropped charge but still allows him to contest evidentiary rulings with a higher court.

Unfortunately, while *Alford* is a valuable tool to resolve even high-profile cases³⁴³ and when used in a conditional plea allows for some appeal of *Daubert* rulings,³⁴⁴ it is not sufficient to address the problem of junk science in criminal justice. *Alford* is disallowed in three states (Indiana, Michigan, and New Jersey), and in U.S. military courts.³⁴⁵ Beyond this, the decision to allow a defendant to plead guilty via *Alford* is up to the prosecutor to offer and the court to accept. Of course, the court has wide discretion to accept or reject any guilty plea, and an *Alford* plea is no exception. But before that plea agreement is even signed by the defendant, the prosecutor must agree to it as well. This means that even in states where *Alford* pleas are routine, any prosecutor at any time may simply refuse to negotiate with a defendant who will not admit his guilt. Thus, *Alford* is not a true right held by criminal defendants, but a tool wielded by prosecutors—who can put it back into their arsenal without deploying it whenever they so choose. As such, it is not a substitute for the prosecutor’s duty to offer significant evidence at trial or to proffer it at a guilty plea.

In addition, *Alford* pleas are arguably a lesser evil of the overall plea-bargaining system; one that ensures more cases get resolved efficaciously but undermines the key values of admitting guilt in open court. Stephanos Bibas argues that the *Alford* plea undercuts the “norm of punishing only those known to be blameworthy,” and allows for victims to be continuously harmed by defendants who plead guilty but publicly maintain innocence.³⁴⁶ A move

³⁴¹ North Carolina v. Alford, 400 U.S. 25 (1970).

³⁴² Stephanos Bibas, *Harmonizing Substantive-Criminal-Law Values and Criminal Procedure: The Case of Alford and Nolo Contendere Pleas*, 88 CORNELL L. REV. 1361, 1363–64 (2003).

³⁴³ An *Alford* plea was used to resolve the high-profile cases of the West Memphis Three and Michael Peterson. The three were likely wrongly convicted of murdering three young boys in the era of “satanic panic.” Echols v. State, 686 S.W.3d 790 (Ark. 2024). Journalist Michael Peterson may have fatally pushed his wife down a staircase, or she might have been killed by an owl. *Mike Peterson Walks Free as 15-year Murder Case Ends with Plea Deal*, WRAL NEWS (Feb. 24, 2017), <https://www.wral.com/mike-peterson-walks-free-after-15-year-murder-case-ends-with-plea-deal/16546848/> [<https://perma.cc/7TDB-H5AH>].

³⁴⁴ A conditional plea allows a defendant to take advantage of a favorable agreement, while also seeking appeal on the admissibility of evidence. See 1 KAREN A. NEWIRTH & ADNAN SULTAN, *PLEAS, PLEA BARGAINING, AND SENTENCING* § 6.05 (2025).

³⁴⁵ Bibas, *supra* note 342, at 1373, 1377, 1381 (2003).

³⁴⁶ *Id.* at 1366.

away from *Alford* pleas and toward wholesale inspection of scientific inquiry, then, serves both sides of the criminal justice system: the victims, who are less at risk of further pain from a defendant's protestation of guilt, and the defendants, who are less at risk of admitting to a crime that later turns out to be erroneous when the science changes.

D. Ensuring an Attack in Addition to Actual Innocence

Actual innocence statutes can be another tool to assess scientific reliability, but they are incredibly narrow and are not often successfully implemented.³⁴⁷ A typical actual innocence statute allows a defendant to petition for post-conviction relief based on his actual innocence—the first such statutes only applied to cases where DNA evidence was tested or discovered post-conviction, but some states have expanded their statutes to include evidence other than DNA.³⁴⁸ In a perfect world, all states and the federal government would allow convicted defendants to petition for a new trial or to set aside a guilty plea in light of any changing science; an actual innocence statute does allow for some such relief, but most do not fully address the issue by failing to cover guilty pleas or restricting their application solely to DNA cases. Also, post-conviction statutes across the country do not specifically or sufficiently address issues involving the changing scientific landscape.

For instance, Kentucky's post-conviction DNA testing statute only applies to *Alford* pleas and in capital cases.³⁴⁹ Other states attempt to address the issue of changing science by adding additional language to their actual innocence statute; the Innocence Project has been chronicling these changes.³⁵⁰ However, most of these statutes specifically address trials, and not guilty pleas. For example, Tex. Code Crim. Proc. Art. 11.073 “applies to relevant scientific evidence that: . . . (2) contradicts scientific evidence relied on by the state *at trial*.”³⁵¹ Cal. Pen. Code § 1473(b) allows for a writ of habeas corpus when “a significant dispute has emerged or further developed in the petitioner's favor regarding expert medical, scientific, or forensic testimony that was introduced at trial and contributed to the conviction, such that it would have more

³⁴⁷ See *McQuiggin v. Perkins*, 569 U.S. 383 (2013) (“ . . . tenable actual-innocence gateway pleas are rare”).

³⁴⁸ Colin Miller, *Why States Must Consider Innocence Claims After Guilty Pleas*, 10 U.C. IRVINE L. REV. 671, 689 (2020). Such post-conviction relief statutes vary greatly in the details; some have statutes of limitation, some require showing that trial counsel could not have discovered the exculpatory evidence, and others are still limited to biological evidence. Some limit relief to a two-year period following conviction, others only allow such testing after a verdict in a capital case. See generally *id.*

³⁴⁹ See KY. REV. STAT. § 422.285(5)(d), (6)(d) (West 2019); see also *Owens v. Commonwealth*, 512 S.W.3d 1, 8 (Ky. App. 2017) (“[T]he right to DNA testing is not available to someone who pleaded guilty to the offense, unless the death penalty was imposed.”).

³⁵⁰ See THE INNOCENCE PROJECT, <https://innocenceproject.org/tags/revealing-wrongful-conviction/> [<https://perma.cc/8XQS-96DW>] (last visited Dec. 15, 2025); THE NAT'L REGISTRY OF EXONERATIONS, <https://www.law.umich.edu/special/exoneration/Pages/Forensics.aspx> [<https://perma.cc/SRH6-RXEJ>] (last visited Dec. 15, 2025).

³⁵¹ TEX. CODE CRIM. PROC. ANN. art. 11.073 (West 2025) (emphasis added).

likely than not changed the outcome *at trial*.”³⁵² And Michigan’s statute allows for relief based on:

new scientific evidence. This includes, but is not limited to, shifts in science entailing changes: (a) in a field scientific knowledge, including shifts in scientific consensus; (b) in a testifying expert’s own scientific knowledge and opinions; or (c) in a scientific method on which the relevant evidence *at trial* was based.³⁵³

Likewise, Nevada’s actual innocence statute does not clearly apply to a guilty plea:

“Newly discovered evidence” means evidence that was not available to a petitioner at trial or during the resolution by the trial court of any motion to withdraw a guilty plea or motion for new trial and which is material to the determination of the issue of factual innocence, including, without limitation: . . . (3) relevant forensic scientific evidence . . . that undermines materially forensic scientific evidence presented *at trial*.³⁵⁴

Without clear application to guilty pleas, actual innocence statutes are virtually useless in combating scientific reliability in over ninety-five percent of all criminal cases, reinforcing the need for changes to the plea colloquy.

E. *Acknowledging That There are No Other Viable Options*

Researchers have studied the growth rate of science over time, and it is nothing short of astounding compared with an overview of how the law changes over time.

Growth of science is an ongoing topic in empirical and theoretical studies on science of science. In a recent overview of science of science studies, Fortunato *et al.* stated that “early studies discovered an exponential growth in the volume of scientific literature . . . a trend that continues with an average doubling period of 15 years.”³⁵⁵

Scientists thus characterize this doubling rate as evidence of the size and gravity of modern scientific inquiry: “[i]f the literature doubles every 15 years, science would be characterized by immediacy: ‘the bulk of knowledge remains

³⁵² CAL. PEN. CODE § 1473(b)(D) (West 2025) (emphasis added); *see also* W. Va. Code § 53-4A-1(b)(1) (2025) (“[A] contention or contentions shall not be deemed to be previously and finally adjudicated when either relevant forensic scientific evidence exists that was not available to be offered by a petitioner at the time of the petitioner’s conviction or which undermines forensic scientific evidence relied on by the state at trial; and there is a reasonable probability there would be a different outcome at trial.”).

³⁵³ MICH. CT. R. 6.502 (emphasis added).

³⁵⁴ NEV. REV. STAT. ANN. § 34.930 (West 2025) (emphasis added).

³⁵⁵ Lutz Bornmann, Robin Haunschild & Rüdiger Mut, *Growth Rates of Modern Science: A Latent Piecewise Growth Curve Approach to Model Publication Numbers from Established and New Literature Databases*, 8 HUMAN & SOC. SCI. COMMUN., 2021, at 2 [<https://doi.org/10.1057/s41599-021-00903-w>].

always at the cutting edge.”³⁵⁶ Further, this growth is compounded over time: “the development of science follows the law of exponential growth: “at any time the rate of growth is proportional to the . . . total magnitude already achieved—the bigger a thing is, the faster it grows.”³⁵⁷

In stark contrast, while a singular law may change in a moment, large-scale changes in the law take time. It takes months, if not years, for Congress to pass a law once a bill goes through committee in both chambers. Then, only after an executive signs it or the legislature overrides their veto does it go into effect. Not only does this process take procedural time, but it also takes time for members of Congress to substantively agree to introduce bills. Only once an approved bill is signed into law can a court review the constitutionality of it, and although that can happen with one singular opinion, no final word on constitutionality ever occurs until the Supreme Court rules after the case progresses through lower courts.

All of this is to say that it takes quite a bit of time to enact a new law or to review one already enacted. Scientific discovery, on the other hand, is evolving at an astronomically fast rate all across the world. What is scientifically true today may not be scientifically true tomorrow and may be painfully and obviously false in six months’ time. Meanwhile, criminal defendants serving lengthy sentences do not benefit from any of these scientific discoveries unless the court allows it to be so. The same should be true relative to scientific inquiry; rapid changes in scientific discovery should lead to rapid changes in how the legal system reacts to using that science in convicting criminal defendants. Because the legal system does not evolve at the same rate as scientific discovery, we see defendants linger in custody from convictions that were once scientifically based but are no longer logically sustainable. A plea colloquy that memorializes the scientific standards relied upon at the time of the plea provides at least some mechanism for justice in light of changing technology.

CONCLUSION

Professor Canon describes the American plea system, with all its wide acceptance, as “fast justice.”³⁵⁸ But justice requires evidence, transparency, and certainty, and there are consequences to the speed at which the system churns through those convicted of a crime to the point that justice is elusive. In the plea system:

[b]argaining over basic liberties plays out day after day, life after life, in near total darkness. Unlike trials, which are a matter of public record, plea negotiations happen in secret, often without the defendant knowing they are happening until the last minute. We don’t see the facts of criminal cases (such as whether the prosecution

³⁵⁶ *Id.*

³⁵⁷ *Id.*

³⁵⁸ CANON, *supra* note 31, at 8.

has enough proof or whether the cops followed the rules) because those facts don't matter if a defendant is just going to plead anyway. There are no juries, no appeals, and no time for questions. The lawyers who make the deals are not held accountable for the evidence they did or did not present, or for the case they did or did not make on behalf of their clients, or for much of anything.³⁵⁹

The plea system is in desperate need of overhaul, and while one article cannot possibly atone for all its faults, it can offer a solution to the looming problem of scientific evolution—by including it in plea evaluation. Judges have wide latitude in reviewing pleas—and they should exercise that by ensuring, on the record, that each plea is supported by scientific methodology. Whether that comes in the form of an enhanced or specified plea colloquy or through a more involved proffer of evidence to support the plea is up to an individual judge. But the solution's efficacy is in expediency—one need not convince a legislature or an executive that this is worthy of implementation. Such a rare opportunity should be taken, for the benefit of science, for the benefit of the criminal defendant, and for the benefit of the system as a whole.

³⁵⁹ *Id.*