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FIREARMS IDENTIFICATION: THE NEED FOR A CRITICAL APPROACH TO, AND POSSIBLE GUIDELINES FOR, THE ADMISSIBILITY OF “BALLISTICS” EVIDENCE

[T]he forensic science disciplines exhibit wide variability with regard to techniques, methodologies, reliability, level of error, research, general acceptability, and published material Many of the processes used in the forensic science disciplines are . . . not based on a body of knowledge that recognizes the underlying limitations of the scientific principles [S]ome of these activities [encompassed by the term “forensic science,”] might not have a well developed research base, are not informed by scientific knowledge, or are not developed within the culture of science.¹

I. INTRODUCTION

On September 20, 2001, detectives found a loaded Hi Point, .380 caliber pistol, in the front yard of a home on Esmond Street in Boston.² In the trial of *United States v. Green*,³ the government sought to introduce testimony from a Boston Police detective who claimed that fourteen shell casings, found more than a year earlier at different locations in Boston, all came from that same gun.⁴ The police detective concluded that this match could be made “to the exclusion of every other firearm in the world.”⁵

Firearms identification is a type of forensic science that has long been used in courts as evidence.⁶ Testimony to a “match,” like that offered by the government’s expert in *Green*, has been used in courts for decades, and the reliability of this type of forensic science was once taken for

¹ NAT’L RESEARCH COUNCIL OF THE NAT’L ACADS., STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD 38-39 (2009) [hereinafter STRENGTHENING FORENSIC SCIENCE], *quoted in* Procedural Order: Trace Evidence at 1-2, *United States v. Oliveira*, No. 1:08-cr-10104-NG (D. Mass. Mar. 8, 2010), *available at* <http://www.mad.uscourts.gov/boston/pdf/ProcOrderTraceEvidenceUPDATE.pdf>.

² *See United States v. Green*, 405 F. Supp. 2d 104, 107 (D. Mass. 2005) (describing location of shooting at issue in case).

³ 405 F. Supp. 2d 104 (D. Mass. 2005).

⁴ *See id.* (detailing locations where forensic evidence was discovered).

⁵ *See id.* at 107 (explaining government’s key expert testimony in the case).

⁶ *See generally* *Commonwealth v. Best*, 62 N.E. 748, 750 (Mass. 1902) (allowing evidence of comparison of bullets to prove three bullets passed through same rifle barrel).

granted.⁷ Recently, many forms of forensic science, including firearms identification, have been subject to scholarly scrutiny, and the reliability of firearms identification evidence has been significantly criticized.⁸ Regardless of the criticism, admissibility of various types of forensic evidence is still the norm.⁹

In many cases in which firearms identification is used as evidence, the liberties at stake are significant.¹⁰ Indeed, the defendants in *Green* faced the death penalty.¹¹ While these cases may not turn on the firearms identification alone, this evidence should not be submitted to a jury without establishing reliability.¹² The problems with the admissibility and reliability of forensic evidence may be widespread, and the justice system could significantly suffer as a result.¹³

⁷ See Adina Schwartz, *A Systemic Challenge to the Reliability and Admissibility of Firearms and Toolmark Identification*, 6 COLUM. SCI. & TECH. L. REV. 2, 33 (2005), <http://www.stlr.org/cite.cgi?volume=6&article=2> (“[N]o court has recognized the systemic scientific problems with firearms identification. Instead, courts have tended to wave away challenges to the reliability and admissibility of this type of testimony by pointing to its longstanding admission in court.”).

⁸ See Paul C. Giannelli, *Forensic Science: Under the Microscope*, 34 OHIO N.U. L. REV. 315, 340 (2008) (“[T]here is a critical need for independent scientific validation of forensic techniques.”); see also J. Herbie DiFonzo & Ruth C. Stern, *Devil in a White Coat: The Temptation of Forensic Evidence in the Age of CSI*, 41 NEW ENG. L. REV. 503, 531-32 (2007) (criticizing acceptance of “junk science” and arguing for “fundamental reevaluation” of forensic evidence in the courtroom); Michael J. Saks & Jonathan J. Koehler, *The Coming Paradigm Shift in Forensic Identification Science*, 309 SCI. 892, 895 (2005) (“[W]e envision a paradigm shift in the traditional forensic identification sciences in which untested assumptions and semi-informed guesswork are replaced by a sound scientific foundation and justifiable protocols.”). “[T]he time is ripe for the traditional forensic sciences to replace antiquated assumptions of uniqueness and perfection with a more defensible empirical and probabilistic foundation.” Saks & Koehler, *supra*.

⁹ See *Green*, 405 F. Supp. 2d at 122 (“Although the scholarly literature is extraordinarily critical, court after court has continued to allow the admission of this testimony.” (footnote omitted)); see also Simon A. Cole, *Toward Evidence-Based Evidence: Supporting Forensic Knowledge Claims in the Post-Daubert Era*, 43 TULSA L. REV. 263, 263-64 (2007) (“[C]ase law strongly supports the conclusion that the exclusion under the *Daubert/Kumho* standard for forensic evidence proffered by the government remains rare indeed, despite some recent exclusions.”).

¹⁰ See *Green*, 405 F. Supp. 2d at 109 (noting liberty “hang[ing] in the balance” for defendants in this case was “life itself”).

¹¹ *Id.*

¹² See DiFonzo & Stern, *supra* note 8, at 503-07 (explaining “CSI effect” on jurors). Specifically, the problem with the “CSI effect” is the “misleading presentation of forensic evidence [to the jury] in the guise of scientific truth.” *Id.* at 507; see also William C. Thompson & Rachel Dioso-Villa, *Turning a Blind Eye to Misleading Scientific Testimony: Failure of Procedural Safeguards in a Capital Case*, 18 ALB. L.J. SCI. & TECH. 151, 155-69 (2008) (demonstrating problem of forensic evidence presented to jury in a misleading manner through a case analysis).

¹³ See Thompson & Dioso-Villa, *supra* note 12, at 151 (“[S]ystemic problems with the use of scientific evidence . . . could affect the fairness of criminal trials nationwide . . .”); Edward J.

The court in *Green* acknowledged scholarly criticism, but reluctantly followed significant precedent to admit ballistics testimony.¹⁴ The court admitted the expert's testimony comparing the gun and the shell casings, but the court did not admit the statement that the shell casings came from the specific pistol, "to the exclusion of every other firearm in the world."¹⁵ While the court noted that ballistic testimony has long-standing recognition, it issued a warning: "[The] reliance on long-standing use of ballistics evidence in the courts is troubling. It runs the risk of 'grandfathering in irrationality,' without reexamining it in the light of [present evidentiary standards]."¹⁶

This Note explores the problems with the reliability of firearms identification evidence and the resulting implications for the future of its admissibility in trials, by first describing the history of the use of firearms identification as evidence.¹⁷ This Note then focuses on the standards of admissibility and how courts apply those standards, by discussing various cases with significant rulings on admissibility.¹⁸ Additionally, this Note also explains scholarly criticism of firearms identification evidence.¹⁹ Finally, this Note discusses problems with the current state of admissibility of firearms identification evidence, and it explores cases offering potential new guidelines for this type of evidence.²⁰

II. HISTORY AND BACKGROUND

Firearms identification is "the analysis of bullet and cartridge case evidence and the use of that evidence to link specimens to each other and to particular weapons."²¹ The Federal Bureau of Investigation ("FBI") once defined this discipline more specifically as the "forensic science discipline that identifies a bullet, cartridge case or other ammunition component as

Ungvarsky, *The CSI Effect: The True Effect of Crime Scene Television on the Justice System: Remarks on the Use and Misuse of Forensic Science to Lead to False Convictions*, 41 NEW ENG. L. REV. 609, 616 ("Ballistic toolmark evidence is just one example of a forensic field whose application can lead to a wrongful conviction."); see also *infra* note 45 and accompanying text.

¹⁴ *Green*, 405 F. Supp. 2d at 109 (allowing testimony because judge thought any other decision would be rejected by appellate courts).

¹⁵ *Id.* at 108-09.

¹⁶ *Id.* at 123.

¹⁷ See *infra* notes 22-28 and accompanying text.

¹⁸ See *infra* notes 29-49, 62-100 and accompanying text.

¹⁹ See *infra* notes 50-61 and accompanying text.

²⁰ See *infra* Part IV.

²¹ See *Commonwealth v. Pytou Heang*, 942 N.E.2d 927, 937 (Mass. 2011) (internal quotation marks omitted) (quoting NAT'L RESEARCH COUNCIL OF THE NAT'L ACADS., BALLISTIC IMAGING 15 (2008)).

having been fired by a particular firearm to the exclusion of all other firearms.”²² This type of forensic science is often referred to as “ballistics” (e.g., “ballistics testimony” or “ballistics evidence”); however, this term is considered incorrect by scholars, as “ballistics” is the “study of the dynamics of projectiles in flight,” not specifically the study of bullets or cartridges projected from a firearm.²³ Firearms identification involves the comparison of “toolmarks,” which are markings or impressions left on the bullet or cartridge case when the firearm is discharged.²⁴ Various characteristics of toolmark impressions are produced that allow for comparison of bullets and cartridge cases.²⁵ According to firearms examiners, individual toolmark characteristics are unique and can be associated with a specific firearm.²⁶

A. Use in Courts as Evidence

Firearms identification was first used as evidence in trials in the early 1900s.²⁷ Although there was some criticism of the technique in early

²² FED. BUREAU OF INVESTIGATION, U.S. DEP’T OF JUSTICE, HANDBOOK OF FORENSIC SCIENCE 57 (1994). The FBI Handbook introduced firearms-toolmarks services provided by the FBI, claiming, “Examinations may positively conclude that the bullet or cartridge case was or was not fired by a particular firearm.” *Id.*

²³ See *Pytou Heang*, 942 N.E.2d at 938 n.15 (quoting NAT’L RESEARCH COUNCIL OF THE NAT’L ACADS., BALLISTIC IMAGING 15 (2008)) (“The more precise term is either ‘forensic ballistics’ or ‘firearms identification.’”); see also Paul C. Giannelli, *Daubert Challenges to Firearms (“Ballistics”) Identifications*, 43 CRIM. L. BULL. 548, 549 (2007) (noting common terminology was incorrect).

²⁴ See Paul C. Giannelli, *Firearms Identification (“Ballistics”)*, CRIM. JUST., Winter 2007, at 28, 28 (describing basics of firearms identification).

²⁵ See *United States v. Green*, 405 F. Supp. 2d 104, 110-11 (D. Mass. 2005) (explaining “ballistics” examination and classes of characteristics). Toolmarks can include “class” or “sub-class” characteristics as well as individual characteristics. *Id.* at 107. Class and sub-class characteristics occur as part of the manufacturing process; therefore, hundreds of firearms can contain the same class or sub-class characteristics. *Id.* at 111. In contrast, individual characteristics are “imparted from the actual piece, the actual tool.” *Id.*

²⁶ STRENGTHENING FORENSIC SCIENCE, *supra* note 1, at 150 (“[I]ndividual characteristics’ of toolmarks . . . are reproduced by the use of that tool and only that tool.”). Toolmark identification is not limited to firearms; “[t]oolmarks are generated when a hard object (tool) comes into contact with a relatively softer object.” *Id.* “[T]oolmarks may occur in the commission of a crime when an instrument such as a screwdriver, crowbar, or wire cutter is used or when the internal parts of a firearm make contact with the brass and lead that comprise ammunition.” *Id.*

²⁷ See *Commonwealth v. Best*, 62 N.E. 748, 750 (Mass. 1902) (allowing evidence of comparison of bullets to prove all passed through same rifle barrel). Chief Justice Oliver Wendall Holmes authored the opinion and stated, “We see no other way in which the jury could have learned so intelligently how that gun barrel would have marked a lead bullet fired through it, a question of much importance to the case.” *Id.* at 750; see also *Commonwealth v. Pytou Heang*, 942 N.E.2d 927, 937 (2011) (noting *Best* first court to uphold admissibility of forensic ballistics

cases, firearms identification became widely accepted in courts across the country.²⁸ However, the standards for admissibility of scientific evidence and expert testimony changed considerably over time.²⁹ For example, in 1923, in *Frye v. United States*,³⁰ the District of Columbia Circuit established the original standard for admissibility of expert testimony on scientific evidence.³¹ The court in *Frye* rejected the admissibility of testimony based on an early form of the polygraph test.³² The court held that the technique or theory must have gained “general acceptance” in the specific scientific field.³³ The *Frye* standard was adopted nationwide and remained the basis for expert testimony for seventy years.³⁴

In 1993, the Supreme Court relaxed the standard of admissibility of scientific evidence and expert testimony in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*³⁵ In place of the “general acceptance” test of *Frye*, the Court established several factors that judges can use to determine whether scientific evidence is reliable and admissible as evidence.³⁶ The

evidence from expert testimony).

²⁸ See *People v. Berkman*, 139 N.E. 91, 94 (Ill. 1923) (finding that statement identifying bullet fired from a specific gun was “preposterous”). But see *People v. Fisher*, 172 N.E. 743, 754 (Ill. 1930) (finding expert testimony that shotgun shells were fired from specific shotgun was “competent”); Giannelli, *supra* note 23, at 549 (explaining after early cases the firearms identification technique “gained widespread judicial acceptance”). Giannelli also noted that *Fisher* was one of the first courts to admit this type of evidence. Giannelli, *supra* note 23, at 549.

²⁹ Compare *Frye v. United States*, 293 F. 1013, 1014 (D.C. Cir. 1923) (establishing original standard of admissibility of scientific evidence), with *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 587 (1993) (abolishing standard of admissibility adopted in *Frye* for a more relaxed standard). See *infra* notes 31-42 and accompanying text (explaining change in admissibility standard).

³⁰ 293 F. 1013 (D.C. Cir. 1923).

³¹ *Id.* at 1014 (“When the question involved does not lie within the range of common experience or common knowledge, but requires special experience or special knowledge, then the opinions of witnesses skilled in that particular science, art, or trade to which the question relates are admissible in evidence.”).

³² See *id.* at 1013-14 (describing “systolic blood pressure deception test”).

³³ See *id.* at 1014.

Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential force of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.

Id.

³⁴ See *Daubert*, 509 U.S. at 587 (1993) (rejecting standard of admissibility adopted in *Frye*).

³⁵ 509 U.S. 579, 597 (1993).

³⁶ See *Daubert*, 509 U.S. at 593-95 (discussing several factors pertinent to judge’s inquiry

standard under *Daubert* is one of reliability and relevancy.³⁷ The Court in *Kumho Tire Co. v. Carmichael*³⁸ followed this approach to admissibility and held that the reliability standard of *Daubert* applies to all expert testimony, not only to scientific evidence.³⁹ The Court in *Kumho*, following *Daubert*, emphasized that it is up to the trial judge to determine reliability.⁴⁰ Moreover, the holding in *Daubert* is codified as Rule 702 of the Federal Rules of Evidence.⁴¹ To date, thirty-two states have adopted the *Daubert* standard, twelve states have rejected it, and seven states have neither accepted nor rejected *Daubert*.⁴²

The flexible standard of *Daubert* and *Kuhmo* permits tremendous

into admissibility of scientific evidence); *see also supra* note 33 and accompanying text (discussing the *Frye* standard). The factors established include: (1) whether the theory or technique can be or has been tested; (2) whether the theory has been subject to peer review and publication; (3) the potential or known rate of error; (4) the existence and maintenance of standards controlling the technique's operation; and (5) general acceptance in the relevant scientific community. *Daubert*, 509 U.S. at 593-94.

³⁷ *Daubert*, 509 U.S. at 592-93 (“[Admissibility of scientific testimony] entails a preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid and of whether that reasoning or methodology properly can be applied to the facts in issue.”).

³⁸ 526 U.S. 137 (1999).

³⁹ *See id.* at 147-48 (“[A]s a matter of language, [Rule 702 of the Federal Rules of Evidence] applies its reliability standard to all ‘scientific,’ ‘technical,’ or ‘other specialized’ matters within its scope. We concede that the Court in *Daubert* referred only to ‘scientific’ knowledge. But as the Court there said, it referred [only] to ‘scientific’ testimony ‘because that was the nature of the expertise’ at issue.”).

⁴⁰ *Id.* at 152 (“Otherwise, the trial judge would lack the discretionary authority needed both to avoid unnecessary ‘reliability’ proceedings in ordinary cases where the reliability of an expert’s methods is properly taken for granted, and to require appropriate proceedings in the less usual or more complex cases where cause for questioning the expert’s reliability arises.”).

⁴¹ *See* FED. R. EVID. 702.

If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise, if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.

Id.

⁴² *See* MARTIN S. KAUFMAN, ATL. LEGAL FOUND., THE STATUS OF DAUBERT IN STATE COURTS 1-3 (2006), available at <http://www.atlanticlegal.org/daubertreport.pdf> (discussing different states’ approaches following *Daubert*); *see also* Order Amending the Arizona Rules of Evidence & Rule 17.4(f), Arizona Rules of Criminal Procedure at 34, *In re* Petition to Amend Rules of Evid. & Rule 17.4(f), Ariz. Rules of Crim. Proc., No. R-10-0035 (Ariz. Sept. 7, 2011), available at <http://www.azcourts.gov/Portals/21/MinutesCurrent/R100035.pdf> (adopting Federal Rule of Evidence 702 as state standard of admissibility); S. 1, 2011 Leg., Jan. Spec. Sess. (Wis. 2011), available at <https://docs.legis.wisconsin.gov/2011/related/acts/2.pdf> (amending state statute 907.02 to comply with Federal Rule of Evidence 702).

leeway for admissibility of scientific evidence.⁴³ Often, the expert will attempt to testify to the “ultimate conclusion”; in cases of firearms identification, this means that the bullet or cartridge is a match “to the exclusion of every other firearm in the world.”⁴⁴ However, scientific evidence, including firearms identification and expert testimony derived from that evidence, has not always been reliable: one firearms identification audit concluded that “the negative impact on the judicial system [of firearms identification] would be substantial, with a strong likelihood of wrongful convictions and a valid concern about numerous appeals.”⁴⁵

After *Daubert*, there were more challenges to the use of forensic science in the courtroom, including challenges to the use of firearms identification; however, despite these challenges, courts continued to admit firearms identification expert testimony.⁴⁶ Five years after *Daubert*, the Supreme Court in *United States v. Scheffer*⁴⁷ compared polygraph evidence with “more acceptable forms of expert testimony,” including testimony regarding “ballistics.”⁴⁸ Although the Court in *Scheffer* was not

⁴³ See *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 590-91 (1993) (establishing admissibility standard of scientific evidence based on reliability and relevance); see also *Kumho Tire*, 526 U.S. at 141 (following holding of *Daubert*).

⁴⁴ See *United States v. Green*, 405 F. Supp. 2d 104, 107 (D. Mass. 2005) (quoting Boston Police Sergeant Detective James O’Shea); see also STRENGTHENING FORENSIC SCIENCE, *supra* note 1, at 150 (“Firearm and toolmark examiners believe that toolmarks may be traced to the physical heterogeneities of an individual tool—that is, that ‘individual characteristics’ of toolmarks may be uniquely associated with a specific tool or firearm . . .”). This type of “exact match” and “ultimate conclusion” testimony occurs in cases involving other types of forensic science as well, such as handwriting analysis cases. See *United States v. Mooney*, 315 F.3d 54, 61-64 (1st Cir. 2002) (allowing handwriting expert’s testimony that defendant was author of certain letters admitted into evidence); *United States v. Hines*, 55 F. Supp. 2d 62, 63-64 (D. Mass. 1999) (disallowing expert to testify to actual authorship of note in handwriting analysis case).

⁴⁵ See FORENSIC SCI. DIV., MICH. STATE POLICE, DETROIT POLICE DEP’T FIREARMS UNIT PRELIMINARY AUDIT FINDINGS AS OF SEPTEMBER 23, 2008, at 3 (2008) (alteration in original). Of the thirty-three cases that were reanalyzed, three exhibited inconsistencies, such as an erroneous identification, false identification, or false positive. *Id.* In total, this equates to approximately 10% of the completed firearms cases having significant errors. *Id.*; see also Saks & Koehler, *supra* note 8, at 892 (explaining data analysis results from 86 exonerated DNA cases). In a study of post-conviction DNA exonerations conducted by the Innocence Project at Cardozo School of Law, forensic evidence testing errors occurred in 63% of cases, and false or misleading testimony by forensic scientists occurred in 27% of cases. Saks & Koehler, *supra* note 8, at 892.

⁴⁶ See Giannelli, *supra* note 24, at 28 (“Once *Daubert* attacks on the admissibility of handwriting and fingerprint evidence had been launched, it was inevitable that firearms and toolmark identifications would also be challenged. The initial attacks failed.”).

⁴⁷ 523 U.S. 303 (1998).

⁴⁸ See *Scheffer*, 523 U.S. at 313 (comparing polygraph evidence to “analysis of fingerprints, ballistics, or DNA found at a crime scene”); see also *Green*, 405 F. Supp. 2d at 123 (explaining *Scheffer* and effect on acceptance of ballistics evidence).

considering the admissibility of firearms identification evidence, because of the “casual reference to ballistics, likely without any argument on the issue, many lower courts have cited this opinion as validating the use of ballistics experts.”⁴⁹

III. FACTS

A. Criticism of Admissibility of Firearms Identification Evidence

Many techniques in various areas of forensic science, including firearms identification, have long been subject to criticism.⁵⁰ Recently, there has been more skepticism of methodologies used in the field of forensic science, and scholars have called for validation of these “scientific” techniques.⁵¹ In 2005, the FBI discontinued bullet lead examinations, a specific type of ballistics analysis in which crime scene bullets are compared to bullets associated with a particular suspect.⁵² One of the significant reasons for this discontinuation was that “neither scientists nor bullet manufacturers are able to definitively attest to the significance of an association made between bullets in the course of a bullet lead examination.”⁵³

In 2009, the National Research Council (“NRC”) of the National Academy of Sciences published a report to Congress identifying the needs of the forensic science community, which has brought to light the serious problems with various types of forensic evidence on a national scale.⁵⁴ One of the main problems with the firearms identification methodology is that the final conclusion is subjective:

⁴⁹ *Green*, 405 F. Supp. 2d at 123; see cases cited *supra* note 48.

⁵⁰ See *supra* note 8 and accompanying text (discussing scholarly criticism of forensic science techniques); see also *supra* note 28 and accompanying text (discussing early criticism of firearms identification evidence).

⁵¹ See, e.g., STRENGTHENING FORENSIC SCIENCE, *supra* note 1, at 12-13; Giannelli, *supra* note 8, at 316, 340 (acknowledging “generation of reform” and “critical need for independent scientific validation of forensic techniques”); Saks & Koehler, *supra* note 8, at 895 (identifying need for “sound scientific foundation and justifiable protocols” in forensic identification sciences).

⁵² See Press Release, FBI Nat’l Press Office, FBI Laboratory Announces Discontinuation of Bullet Lead Examinations (Sept. 1, 2005), available at <http://www.fbi.gov/news/pressrel/press-releases/fbi-laboratory-announces-discontinuation-of-bullet-lead-examinations> (explaining reasoning for discontinuance).

⁵³ See *id.*

⁵⁴ See STRENGTHENING FORENSIC SCIENCE, *supra* note 1, at xx (“The forensic science system, encompassing both research and practice, 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.”).

[The] determination of a match is always done through direct physical comparison of the evidence by a firearms examiner, not the computer analysis of images [E]ven with more training and experience using newer techniques, the decision of the toolmark examiner remains a subjective decision based on unarticulated standards and no statistical foundation for estimation of error rates.⁵⁵

The Supreme Court cited the 2009 NRC report in *Melendez-Diaz v. Massachusetts*,⁵⁶ noting that “[s]erious deficiencies have been found in the forensic evidence used in criminal trials.”⁵⁷

A similar report published by the National Research Council in 2008, specifically on “Ballistic Imaging,” concluded that “[t]he validity of the fundamental assumptions of uniqueness and reproducibility of firearms-related toolmarks has not yet been fully demonstrated.”⁵⁸ Additionally, regarding the type of exact-match conclusion that the prosecution tried to admit in *Green*, the 2008 NRC report concluded,

[E]xaminers tend to cast their assessments in bold absolutes, commonly asserting that a match can be made “to the exclusion of all other firearms in the world.” Such comments cloak an inherently subjective assessment of a match with an extreme probability statement that has no firm grounding and unrealistically implies an error rate of zero.⁵⁹

The findings of the NRC reports opened the door for defense attorneys to challenge the validity of firearms identification evidence.⁶⁰ In

⁵⁵ See *id.* at 153-54.

⁵⁶ 129 S. Ct. 2527 (2009).

⁵⁷ *Id.* at 2537.

⁵⁸ See NAT'L RESEARCH COUNCIL OF THE NAT'L ACADS., BALLISTIC IMAGING 81 (2008), cited in Paul C. Giannelli & Susan Friedman, *The National Academy of Sciences' Forensics Report*, 45 CRIM. L. BULL. 1109, 1130 (2009).

⁵⁹ NAT'L RESEARCH COUNCIL OF THE NAT'L ACADS., BALLISTIC IMAGING 82 (2008); see *United States v. Green*, 405 F. Supp. 2d 104, 107 (D. Mass. 2005).

⁶⁰ See Giannelli & Friedman, *supra* note 58, at 1136.

In the short run, the Report will be used by defense counsel to challenge forensic techniques. Overstatements should be challenged: The NAS Report criticized “exaggerated” testimony such as claims of “perfect accuracy,” infallibility, and “zero error rates.” After the Report, it will be difficult for testimony that uses this jargon to

light of the NRC reports, more courts followed some of the reasoning in *Green* to disallow testimony as to a match “to the exclusion of every other firearm in the world.”⁶¹

B. Courts Admitting Firearms Identification Evidence

Cases decided after *Daubert*, but before the release of the NRC reports, often cited the long history of recognizing the reliability of firearms identification as reasoning for its admissibility.⁶² In *United States v. Hicks*,⁶³ the defense challenged the reliability of the methodology of the prosecution’s expert, who claimed that he could match shell casings to a specific weapon.⁶⁴ The Fifth Circuit allowed the evidence, stating that “the matching of spent shell casings to the weapon that fired them has been a recognized method of ballistics testing in this circuit for decades.”⁶⁵

Following the decision in *Green*, which was highly critical of the existing ballistics testing methodology, and notwithstanding scholarly criticism of firearm identification techniques, some courts nevertheless continue to find firearms identification to be reliable and allowed testimony as to a “match” between recovered bullets or cartridges and a specific firearm.⁶⁶ A Massachusetts case, *Commonwealth v. Meeks*,⁶⁷ provides one example in which a challenge to the admissibility of firearms identification evidence failed.⁶⁸ In *Meeks*, the defense sought to exclude this type of

survive objections from defense counsel.

Id.

⁶¹ See *Green*, 405 F. Supp. 2d at 107; see also *infra* notes 82-92 and accompanying text (discussing recent cases allowing testimony but not to an “exact match”).

⁶² See Paul C. Giannelli, *Ballistics Evidence Under Fire*, 25 CRIM. JUST. 50, 50 (2011) (“[I]nitial post-*Daubert* cases challenging the admissibility of firearms . . . identification evidence were unsuccessful.”); see also, e.g., *United States v. Hicks*, 389 F.3d 514, 526 (5th Cir. 2004); *United States v. Foster*, 300 F. Supp. 2d 375, 376 n.1 (D. Md. 2004) (“Ballistics evidence has been accepted in criminal cases for many years [N]umerous cases have confirmed the reliability of ballistics identification.”); *Fleming v. State*, 1 A.3d 572, 590 (Md. Ct. Spec. App. 2010) (“[C]ourts have consistently found the traditional method to be generally accepted within the scientific community, and to be reliable.”).

⁶³ 389 F.3d 514 (5th Cir. 2004).

⁶⁴ See *id.* at 523-24 (describing expert’s testimony).

⁶⁵ *Id.* at 526.

⁶⁶ See, e.g., *United States v. Natson*, 469 F. Supp. 2d 1253, 1261-62 (M.D. Ga. 2007); *Fleming v. State*, 1 A.3d 572, 591 (Md. Ct. Spec. App. 2010); *Commonwealth v. Meeks*, No. 2002-10961, 2006 WL 2819423, at *49 (Mass. Super. Ct. Sept. 28, 2006); *People v. Givens*, 912 N.Y.S.2d 855, 857 (Sup. Ct. 2010).

⁶⁷ No. 2002-10961, 2006 WL 2819423 (Mass. Super. Ct. Sept. 28, 2006).

⁶⁸ 2006 WL 2819423, at *43 (“The ballistics evidence in this case is . . . not excluded as unreliable because ‘the reasoning or methodology underlying the [expert] testimony is’ generally

evidence in two separate murder cases.⁶⁹ Despite the persuasive reasoning of *Green*, which the United States District Court for the District of Massachusetts decided one year earlier, the court held that “[t]he theory and process of firearms identification are generally accepted and reliable.”⁷⁰ However, the court demanded slightly more specific information from the prosecution’s expert, stating that “[a]t trial, this court will require the Commonwealth’s firearms identification witnesses to provide, on direct examination, detailed reasons for their opinions, as well as appropriate documentation such as sketches and photographs.”⁷¹

In more recent cases, both federal and state courts have allowed “exact match” type testimony, despite criticism of the forensic techniques involved.⁷² In *United States v. Natson*,⁷³ decided in 2007, the United States District Court for the Middle District of Georgia allowed an expert to testify to not only a match between the defendant’s gun and a cartridge found at the crime scene, but to a one hundred percent degree of certainty.⁷⁴

As recently as this past year, state court decisions have also allowed for firearms identification expert testimony as to an “exact match.”⁷⁵ In the Maryland case of *Fleming v. State*,⁷⁶ the court cited a forty-year-old case that took “judicial notice” of the reliability of firearms identification.⁷⁷ The court reasoned that firearms identification had long been admitted, and “notwithstanding the current debate on the issue, courts have consistently found the traditional method to be generally accepted

accepted and ‘properly can be applied to the facts in issue.’” (alteration in original) (quoting *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 592-93 (1993)).

⁶⁹ See *id.* at *1-2 (introducing facts of case).

⁷⁰ *Id.* at *50 (concluding that experts could testify as to their opinions of a match).

⁷¹ *Id.* at *48.

⁷² See *infra* notes 73-81 and accompanying text (surveying cases still admitting this type of testimony).

⁷³ 469 F. Supp. 2d 1253 (M.D. Ga. 2007).

⁷⁴ *Id.* at 1261 (“[T]hese toolmarks were sufficiently similar . . . [The expert] opined that he held this opinion to a 100% degree of certainty.”).

⁷⁵ See *Fleming v. State*, 1 A.3d 572, 591 (Md. Ct. Spec. App. 2010); see also *People v. Givens*, 912 N.Y.S.2d 855, 856 (Sup. Ct. 2010).

⁷⁶ 1 A.3d 572 (Md. Ct. Spec. App. 2010).

⁷⁷ *Id.* at 590.

[I]ndeed, *Reed v. State* referred to “ballistics” as an example of a discipline for which “the validity and reliability is so broadly and generally accepted” that under the *Frye-Reed* standard, “a trial court may take judicial notice of its reliability. Although *Reed* was decided over thirty years ago, notwithstanding the current debate on the issue, courts have consistently found the traditional method to be generally accepted within the scientific community, and to be reliable.

Id. (citation omitted) (quoting *Reed v. State*, 391 A.2d 364, 367 (Md. 1978)).

within the scientific community, and to be reliable.”⁷⁸ In a New York state court decision, in *People v. Givens*,⁷⁹ the court allowed testimony that six shell casings recovered from the crime scene were fired from the same gun.⁸⁰ The *Givens* court also cited the traditional acceptance of firearms identification, stating that “[i]n none of the cases cited by the defendant did a Court find that firearms and toolmark identification is no longer scientifically acceptable or is unreliable.”⁸¹

C. Courts Critical of Firearms Identification Evidence

Again, the court in *Green* was one of the first to take a critical look at admissibility of firearms identification evidence, and it disallowed “exact match” testimony as unreliable.⁸² The defendants, facing the death penalty, challenged the admissibility of the forensic ballistics identification evidence under Federal Rule of Evidence 702.⁸³ The court found many problems with the admissibility of the detective’s testimony: the government’s expert had not received proficiency testing or certification in ballistics; he did not follow the toolmark protocols, systematize his past experience, examine any other weapon, make notes or photographs of the evidence, or have data on error rates; and he relied mainly on his subjective judgment without a national standard in conducting an “evidence show-up.”⁸⁴

Since *Green*, and following publication of the NRC reports to Congress, more courts have been critical of expert testimony on firearms identification.⁸⁵ For example, in *United States v. Monteiro*,⁸⁶ a case

⁷⁸ *Fleming*, 1 A.3d at 590 (discussing reason trial court did not err in allowing firearms identification evidence). “The admissibility of expert testimony concerning scientific or forensic evidence is governed in Maryland by the *Frye-Reed* standard, which provides that scientific techniques can be admissible if they are ‘generally accepted’ in the scientific community.” *Id.* at 586; see also *Frye v. United States*, 293 F. 1013, 1014 (D.C. Cir. 1923) (“[T]he thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.”).

⁷⁹ 912 N.Y.S.2d 855 (Sup. Ct. 2010).

⁸⁰ See *id.* at 855, 857 (introducing facts of case and firearms examiner’s opinion that all were fired from same firearm).

⁸¹ See *id.* at 856.

⁸² See *supra* notes 2-5, 10-11, and accompanying text (discussing facts and holding of *Green*).

⁸³ *United States v. Green*, 405 F. Supp. 2d 104, 106 (D. Mass. 2005) (describing defendants’ arguments); see also FED. R. EVID. 702.

⁸⁴ *Green*, 405 F. Supp. 2d at 107-17 (summarizing problems with testimony of government’s expert and detailing expert’s methodology of firearms identification); see also *supra* note 36 and accompanying text (listing factors for determining admissibility under *Daubert*).

⁸⁵ See *Giannelli*, *supra* note 62, at 52 (arguing courts became more critical of firearms

decided in the same federal district court shortly after *Green*, the court held that the firearms identification testimony was inadmissible under Rule 702 because the expert was lacking proper documentation of the examination of the firearm and bullet casing.⁸⁷ The court recognized that “the underlying scientific principle behind firearm identification—that firearms transfer unique toolmarks to spent cartridge cases—is valid under *Daubert*.”⁸⁸ However, it found that due to the subjective nature of the identification, the expert’s qualifications, documentation of the analysis, peer review, and other factors must be highly scrutinized.⁸⁹

Like the court in *Green*, which allowed the expert in that case to testify as to comparisons of the casings and the firearm, but not to the “exclusion of every other firearm in the world,” other courts are allowing testimony regarding firearms identification, but limiting the scope.⁹⁰ In *United States v. Diaz*,⁹¹ the court limited the scope of the expert’s testimony by allowing the expert to testify not to “the exclusion of all other firearms in the world,” but to a limited standard of a “reasonable degree of certainty in the ballistics field.”⁹² Another example of expert testimony being limited in scope was in the case of *United States v. Glynn*.⁹³ The court in *Glynn* permitted the government’s expert to testify that a firearms match was merely “more likely than not,” rather than hold that expert to a higher level of certainty.⁹⁴ The *Glynn* court acknowledged the limitations of this standard: “Because the burden of proof in a criminal case is ‘beyond a reasonable doubt,’ it follows that a conviction in a criminal case

identification techniques).

⁸⁶ 407 F. Supp. 2d 351 (D. Mass. 2006).

⁸⁷ See *id.* at 374 (“Until the basis for the identification is described in such a way that the procedure performed by [the examiner] is reproducible and verifiable, it is inadmissible under Rule 702.”).

⁸⁸ *Id.* at 355.

⁸⁹ See *id.* (“Because of the subjective nature of the matching analysis, a firearms examiner must be qualified through training, experience, and/or proficiency testing to provide expert testimony[.] . . . must follow the established standards for intellectual rigor . . . with respect to documentation of the reasons for concluding there is a match (including, where appropriate, diagrams, photographs or written descriptions), and peer review of the results by another trained examiner in the laboratory. These standards ensure the reliability of the expert’s results and the testability of the opinion.”).

⁹⁰ See *United States v. Green*, 405 F. Supp. 2d 104, 108-09 (D. Mass. 2005); see also *supra* notes 2-5, 14-16 and accompanying text (detailing facts and holding of *Green*).

⁹¹ No. CR 05-00167 WHA., 2007 WL 485967 (N.D. Cal. Feb. 12, 2007).

⁹² *Id.* at *14.

⁹³ See 578 F. Supp. 2d 567, 570 (S.D.N.Y. 2008).

⁹⁴ *Id.* at 574-75 (noting this satisfied Federal Rules of Evidence “without overstating the capacity of the methodology to ascertain matches”). The court noted that in the original trial, the expert was persuaded to add the qualifier “at least” more likely than not; however, the court found that “[t]o add the qualifier ‘at least’ is to inject an element of vagueness.” *Id.* at 575.

may not rest *exclusively* on ballistics testimony.”⁹⁵

A recent Massachusetts case, *Commonwealth v. Pytou Heang*,⁹⁶ proffered new guidelines for the admissibility of firearms identification in Massachusetts courts.⁹⁷ Following some of the reasoning set forth in *Monterio*, the *Pytou Heang* court permitted the expert to testify to a “reasonable degree of ballistic certainty,” similar to how a doctor could testify to cause of death or injuries to a reasonable degree of medical certainty.⁹⁸ The court noted that phrases such as “absolute certainty” should be avoided, and that the phrase “reasonable degree of scientific certainty” should also be avoided because “it suggests that forensic ballistics is a science, where it is clearly as much an art as a science.”⁹⁹ The *Pytou Heang* court also established other guidelines for admissibility, including “before trial, the examiner must adequately document the findings or observations that support the examiner’s ultimate opinion,” and “before an opinion is offered at trial, a forensic ballistics expert should explain to the jury the theories and methodologies underlying the field of forensic ballistics.”¹⁰⁰

IV. ANALYSIS

A. The Need for a Critical Approach

Because the majority of states follow *Daubert*, the factors assessed when determining whether to admit firearms identification evidence should be the same in federal and many state courts throughout the country.¹⁰¹ While some state courts do not follow *Daubert*, their inquiry should

⁹⁵ *Id.* at 575 n.14.

⁹⁶ 942 N.E.2d 927 (Mass. 2011).

⁹⁷ *See id.* at 944-45.

⁹⁸ *Pytou Heang*, 942 N.E.2d at 945; *see also* United States v. Monteiro, 407 F. Supp. 2d 351, 355 (D. Mass. 2006); *supra* notes 86-89 and accompanying text (discussing reasoning in *Monteiro*).

⁹⁹ *See Pytou Heang*, 942 N.E.2d at 946. “[T]his documentary evidence, whether in the form of measurements, notes, sketches, or photographs, shall be provided in discovery, so that defense counsel will have an adequate and informed basis to cross-examine the forensic ballistics expert at trial.” *Id.* at 944.

¹⁰⁰ *See id.* at 944-45 (“This testimony should include . . . explanation of how toolmarks are imparted onto projectiles and cartridge casings; the differences between class, subclass, and individual characteristics of firearms; and the different types of resulting toolmarks that examiners look for and compare . . . which can narrow down the group of weapons that may have fired a particular projectile, and . . . which potentially may permit an opinion that a particular firearm fired a projectile.”).

¹⁰¹ *See supra* note 42 and accompanying text (discussing number of states following federal standard in *Daubert*).

presumably be even more rigorous, as *Daubert* relaxed the *Frye* standard in favor of admissibility.¹⁰² Despite these standards, and despite significant criticism of the techniques of firearms identification, courts across the country remain divided as to the reliability of firearms identification.¹⁰³ Two opposing views have emerged, with one side arguing that firearms identification is “bogus,” and the other retaining the view that this type of forensic “science” is still acceptable in the scientific community.¹⁰⁴ Unquestionably, the field cannot have the reputable status it once held.¹⁰⁵ For example, the NRC reports in 2008 and 2009, critiquing various areas of forensic science, seriously attacked the validity of firearms identification evidence.¹⁰⁶ However, many courts may be “grandfathering in irrationality” by allowing in firearms identification and other forms of forensic evidence without a critical approach.¹⁰⁷

Courts that maintain their faith in firearms identification—and other types of forensic science—cite the long history of its use in trials, and reliability has been taken for granted in many cases.¹⁰⁸ In one case

¹⁰² See *supra* notes 35-37 and accompanying text (discussing how *Daubert* relaxed admissibility standard of *Frye*).

¹⁰³ See Schwartz, *supra* note 7, at 41 (“Adequate statistical empirical foundations and proficiency testing do not exist for firearms and toolmark identification.”); see also discussion *supra* Part II (discussing various courts allowing or disallowing firearms identification evidence).

¹⁰⁴ See Ungvarsky, *supra* note 13, at 610 (labeling FBI’s discontinued bullet lead analysis “bogus science”).

Ballistics is the “forensic science” of eye-balling evidence related to firearms. Anyone could do [it]. Here is how . . . : You look at this picture, look at that picture, and then look at them together. Do they look the same or are they different? If you think they are the same, you say they are the same: a “match.” This type of analysis does not take expertise

Id. at 616. But see *supra* note 62 and accompanying text (discussing courts admitting this type of evidence because of its historical acceptance).

¹⁰⁵ See *supra* notes 54-59 and accompanying text (discussing findings of NRC reports).

¹⁰⁶ See *supra* notes 54-59 and accompanying text.

¹⁰⁷ See *United States v. Green*, 405 F. Supp. 2d 104, 123 (D. Mass. 2005) (criticizing admissibility as taken for granted without a critical approach); see also *supra* text accompanying note 16.

¹⁰⁸ See Schwartz, *supra* note 7, at 33 (“Despite *Daubert* . . . courts have tended to wave away challenges to the reliability and admissibility of this type of testimony by pointing to its longstanding admission in court.”); Giannelli & Friedman, *supra* note 58, at 1128 (noting challenges to admissibility of firearm identification evidence failed recently after *Daubert*); see also *United States v. Hicks*, 389 F.3d 514, 526 (5th Cir. 2004) (“[T]he matching of spent shell casings to the weapon that fired them has been a recognized method of ballistics testing . . . for decades.”); *United States v. Foster*, 300 F. Supp. 2d 375, 376 n.1 (D. Md. 2004) (“Ballistics evidence has been accepted in criminal cases for many years . . . numerous cases have confirmed the reliability of ballistics identification.”); *United States v. Martínez-Cintrón*, 136 F. Supp. 2d 17, 19 (D.P.R. 2001) (“[F]ingerprint evidence has been used for the last hundred years for judicial

involving a different type of forensic evidence, fingerprint analysis, one judge went so far as to admit the evidence because such analysis had significant precedence, stating, “I took for granted that the reliability of [an expert’s] methods is properly taken for granted (like saying the sky is blue or the sun rose in the east yesterday . . .).”¹⁰⁹

The Court in *Daubert* considered the judge as having the “gatekeeper” function of discerning whether scientific evidence is relevant and reliable.¹¹⁰ Under *Daubert*, admissibility of forensic evidence is to be determined on a case-by-case basis.¹¹¹ However, Justice Rehnquist noted in his dissent that the majority ruling in *Daubert* left uncertainties as to how it would be applied, stating, “I do not think [the gatekeeping function] imposes on them either the obligation or the authority to become amateur scientists in order to perform that role.”¹¹² While judges should not have to become amateur scientists, too many are taking traditionally accepted methodologies for granted.¹¹³ Historical precedence should not be enough to warrant admissibility when significant scientific research and reports have invalidated the reliability of long-standing forensic science techniques.¹¹⁴ Courts may be reluctant to disallow evidence once readily

purposes, and the precedence for its use more than satisfies the four-prong *Daubert* standard”); *Fleming v. State*, 1 A.3d 572, 590 (Md. Ct. Spec. App. 2010) (“[C]ourts have consistently found the traditional method to be generally accepted within the scientific community, and to be reliable.”).

¹⁰⁹ See *Martinez-Cintrón*, 136 F. Supp. 2d at 18 n.1 (explaining need for more reasoning for admissibility on appeal).

¹¹⁰ *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 592-93 (1993) (describing role of judge in determining admissibility).

Faced with a proffer of expert scientific testimony, then, the trial judge must determine at the outset . . . whether the expert is proposing to testify to (1) scientific knowledge that (2) will assist the trier of fact to understand or determine a fact in issue. This entails a preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid and of whether that reasoning or methodology properly can be applied to the facts in issue.

Id. (footnote omitted).

¹¹¹ See *Daubert*, 509 U.S. at 592-93; see also *supra* notes 29-42 and accompanying text (describing the development of the standards of admissibility).

¹¹² See *Daubert*, 509 U.S. at 600 (Rehnquist, C.J., dissenting) (“[C]ountless more questions will surely arise when hundreds of district judges try to apply its teaching to particular offers of expert testimony”). “I do not doubt that Rule 702 confides to the judge some gatekeeping responsibility in deciding questions of the admissibility of proffered expert testimony. But I do not think it imposes on them either the obligation or the authority to become amateur scientists in order to perform that role.” *Id.* at 600-01.

¹¹³ See *supra* notes 108-09109 and accompanying text (discussing courts routinely admit evidence because of precedence of admissibility).

¹¹⁴ See *supra* notes 52-59 and accompanying text (discussing NRC Reports and invalidation

admissible; however, the longer it takes to adopt a more systematic approach to admissibility of types of forensic evidence, including firearms identification evidence, the longer the justice system will suffer.¹¹⁵

B. Potential Guidelines

Many courts have recognized the skepticism of the science behind firearms identification and have excluded at least some of the testimony related to this form of evidence.¹¹⁶ Courts have acknowledged that an expert's testimony can assist the trier of fact, but have differed as to what extent an expert's testimony is reliable.¹¹⁷ Many—but certainly not all—courts have disallowed testimony as to an exact match “to the exclusion of every other firearm in the world.”¹¹⁸ Similarly, many courts have prohibited an expert from using phrases like “absolute certainty” and “scientific certainty,” which create an illusion of such certainty where none actually exists.¹¹⁹

The courts in *Monteiro* and *Pytou Heang* proffered more specific guidelines for firearms evidence and new standards of reliability when expert testimony is presented.¹²⁰ In those cases, an expert could testify “to a reasonable degree of ballistic certainty.”¹²¹ Other courts have utilized the

of FBI bullet lead analysis).

¹¹⁵ See Adina Schwartz, *A Systemic Challenge to the Reliability and Admissibility of Firearms and Toolmark Identification*, 6 COLUM. SCI. & TECH. L. REV. 2, 80-91 (2005); see also Larry A. Hammond, *The Failure of Forensic Science Reform in Arizona*, 93 JUDICATURE 227, 228, 230 (2010) (“By routinely allowing into evidence expert testimony that we know today should have been excluded, and by closing courthouse doors to claims for redress after conviction, the courts have contributed to the problems we face today . . . [O]ne would hope that with the announcement of every exoneration the judges across whose desks these cases passed would pause to ask, ‘what can we do to make sure that this doesn’t happen again?’”).

¹¹⁶ See *United States v. Green*, 405 F. Supp. 2d 104, 108-09 (D. Mass. 2005); see also Part III.C.

¹¹⁷ See cases cited *supra* notes 83-96 and accompanying text (discussing various scopes of testimony allowed by courts).

¹¹⁸ See *Green*, 405 F. Supp. 2d at 108-09; but see *United States v. Natson*, 469 F. Supp. 2d 1253, 1261-62 (M.D. Ga. 2007) (admitting testimony of expert to a degree of 100% certainty).

¹¹⁹ See *supra* notes 97-100 and accompanying text (discussing holding and reasoning in *Pytou Heang*).

¹²⁰ See *United States v. Monteiro*, 407 F. Supp. 2d 351, 355 (D. Mass. 2006) (“[T]he expert may give an opinion of a match to a reasonable degree of certainty in the ballistics field. However, the expert may not testify that there is a match to an exact statistical certainty.”); *Commonwealth v. Pytou Heang*, 942 N.E.2d 927, 945 (Mass. 2011) (“Where a qualified expert has identified sufficient individual characteristic toolmarks reasonably to offer an opinion that a particular firearm fired a projectile or cartridge casing recovered as evidence, the expert may offer that opinion to a ‘reasonable degree of ballistic certainty.’”); see also *supra* notes 88-89 and accompanying text (detailing standards set forth in *Monteiro*).

¹²¹ See cases cited *supra* note 120.

standard of “more likely than not” or “a reasonable degree of scientific certainty,” or have allowed an expert to testify as to comparisons made between a firearm and cartridges, but not to an ultimate conclusion of whether they were discharged from a specific gun.¹²²

The court in *Pytou Heang* offered not only the “reasonable degree of ballistic certainty” standard, but also further guidelines for admissibility of firearms identification evidence.¹²³ One of the guidelines provided in *Pytou Heang* would be particularly helpful to jurors to ensure that they have the necessary background information about firearms identification: “[B]efore an opinion is offered at trial, a forensic ballistics expert should explain to the jury the theories and methodologies underlying the field of forensic ballistics.”¹²⁴ Ultimately, it is the jurors that will use the admitted forensic evidence to make a determination of fact.¹²⁵ While the judge may be the gatekeeper of reliability and relevance, the jurors will weigh the evidence admitted, assuming that it is reliable, and they should properly be informed as to its shortcomings.¹²⁶

Not allowing testimony indicating an “absolute certainty” or “scientific certainty” is a step in the right direction, however, phrases such as “a reasonable degree of ballistic certainty” could be confusing to jurors.¹²⁷ For instance, the phrase “ballistic certainty”—especially when “ballistics” is not an accurate term as it encompasses all projectiles—may not sound that different to a juror from the phrase “scientific certainty.”¹²⁸

¹²² See *supra* notes 90-100 and accompanying text (explaining various standards used in courts that have limited scope of expert’s testimony).

¹²³ See *supra* note 100 and accompanying text (discussing guidelines proposed by the *Pytou Heang* court).

¹²⁴ See *Pytou Heang*, 942 N.E.2d at 944.

¹²⁵ See sources cited *infra* note 126.

¹²⁶ See Schweitzer & Saks, *supra* note 115, at 12 (“[J]urors assume that judges review scientific evidence before it is presented to them, and that any evidence used in a trial must be above some threshold of quality. Because of these assumptions, jurors seem to be less critical of scientific evidence used in trials and are more persuaded by it.”); see also DiFonzo & Stern, *supra* note 8, at 505-06 (noting jurors may have preconceived notions of validity of scientific evidence); Ungvarsky, *supra* note 13, at 616 (noting “match” type testimony based on ballistics analysis has powerful effect on jury).

¹²⁷ See *supra* notes 91-99 (discussing various standards of certainty); see also Christina Pazzanese, *New Limits Put on Ballistics Testimony*, MASS. LAWYERS WEEKLY, Feb. 28, 2011, at 27 (quoting one Boston attorney claiming “reasonable degree of ballistic certainty” standard is essentially “made up”); Adina Schwartz, *Challenging Firearms and Toolmark Identification—Part Two*, CHAMPION, Nov./Dec. 2008, at 44 (“[R]estricting firearms and toolmark examiners to testifying that their identifications are based on a ‘reasonable degree of certainty in the ballistics field’ . . . is highly unlikely to make the jury aware that there are serious scientific problems with the discipline.”).

¹²⁸ See *supra* note 23 and accompanying text (explaining why “ballistics” is an inaccurate term).

Both phrases imply “certainty” in this field of forensic science, which as the NRC reports demonstrated, is not accurate.¹²⁹ Indeed, the court in *Glynn* recognized the imperfection of the phrase “reasonable degree of ballistic certainty” and disallowed this testimony in favor of testimony that a match existed “more likely than not.”¹³⁰ The *Glynn* court noted that “ballistics lacked the rigor of science . . . its methodology was too subjective to permit opinions to be stated to ‘a reasonable degree of ballistic certainty.’”¹³¹ The courts in *Pytou Heang*, *Glynn*, and other jurisdictions have taken steps in an attempt to offer greater consistency or establish a more accurate standard of reliability; it remains to be seen, however, whether other courts will follow suit or continue to rely on the traditional approaches and acceptance of firearms identification expert testimony.¹³²

V. CONCLUSION

Researchers in forensic science have found firearms identification techniques, once widely accepted, to have serious flaws because the methodology is an unreliable, subjective analysis. Courts often do not critically apply the *Daubert* factors but merely accept toolmark or ballistics identification as scientifically reliable. Because of the recent criticism of firearms identification, some courts have limited expert testimony concerning the examination of firearms, bullets, and shell casings, for example. However, there has been a great disparity as to what evidence courts are admitting, an obvious issue not only at the state level, but in federal courts as well.

In many cases, courts have prohibited experts from testifying that an exact “match” has been found between a bullet and a firearm. Other courts have allowed experts to testify as to comparisons they have made, or to varying degrees of certainty such as “more likely than not,” or “to a reasonable degree of ballistic certainty.” The problems with reliability of firearms identification evidence have not been recognized in every court, however, and some courts are still allowing experts to testify to a “match” to a degree of “100% certainty.”

¹²⁹ See *supra* notes 54-59 and accompanying text (discussing findings of both NRC reports).

¹³⁰ See *United States v. Glynn*, 578 F. Supp. 2d 567, 571-75 (S.D.N.Y. 2008) (analyzing methodology behind firearms identification and holding testimony to lower standard of certainty); see also *supra* notes 94-95 and accompanying text (discussing expert’s “more likely than not” testimony allowed in evidence).

¹³¹ *Glynn*, 578 F. Supp. 2d at 571.

¹³² See *supra* notes 116-31131 and accompanying text.

Although the *Daubert* factors are to be determined on a case-by-case basis, there is too much disparity between the approaches to admissibility of this type of evidence. Due to the recent scholarly criticism of firearms identification, courts need to be much more critical of its acceptance, and more limiting of testimony regarding this type of forensic science. Because the underlying methodology is the same everywhere, there should be a specific, accurate, and clear standard concerning the extent to which firearms identification evidence should be relied upon and admitted in courts.

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