Reconsidering the Admissibility of Expert Forensic Evidence in South African Criminal Proceedings

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Abstract

Expert forensic evidence can be of great assistance in criminal proceedings. However, the question that must be answered is whether and to what extent there is science in any forensic science discipline. In the last twenty years there have been growing concerns about the admissibility and reliability of expert evidence in criminal trials. Many common law jurisdictions have raised concerns about traditional admissibility standards and their inability to filter out unreliable expert forensic evidence. As a result of these concerns, a number of these jurisdictions have adopted and now apply reliability criteria for the admissibility of this evidence.

In South Africa, expert forensic evidence is admissible if it is relevant. The reliability of the evidence is determined at the end of the trial when the evidence is evaluated. This article examines this position and argues that the current position does not require an assessment of the reliability of expert forensic evidence at the admissibility stage, allowing expert forensic evidence of doubtful reliability to be admitted. It is argued that the admissibility of this evidence should be reconsidered by introducing a reliability standard as a precondition for admissibility.

Keywords

Admissibility; expert forensic evidence; reliability; forensic science; reliability standards

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1 Introduction

Expert forensic evidence is frequently used in criminal proceedings and has created great possibilities for the administration of justice.[1] Forensic evidence refers to physical evidence obtained either at a crime scene or from the victim of a crime, and which is analysed by using scientific methods and processes in a crime laboratory to obtain scientifically based information, which is then presented in court by an expert witness in the form of expert testimony.[2] The reason for introducing expert evidence is that it could assist the trier of fact in deciding the issues in dispute.[3] Forensic evidence thus falls under the category of circumstantial evidence.[4]

Despite the perceived success of expert forensic evidence, some criticism has been levelled against the so-called "infallibility" of this type of evidence. According to the NAS Report,[5] no forensic method except DNA evidence has shown the capacity to consistently and with a high degree of certainty demonstrate a connection between evidence and a specific individual source. Several authors and reports have questioned forensic evidence, including how it is collected at crime scenes, its treatment in the laboratory, how it is introduced in court, the evaluation of this evidence, and its role in

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1 Dror and Morgan 2019 *Journal of Forensic Science* 8-10.

2 Kaplan and Puracal 2018 *Alb L Rev* 899-900. Forensic science has also been defined as the application of scientific or technical practices to the recognition, collection, analysis and interpretation of evidence for criminal and civil law regulatory issues. See PCAST 2016 https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_forensic_science_report_final.pdf (hereafter the PCAST Report) 1. Also see National Research Council 2009 https://www.ojp.gov/pdffiles1/nij/grants/228091.pdf.

3 *S v Van As* 1991 2 SASV 74 (W). The evidence of an expert may be received because by virtue of their specialised knowledge and skill they are better qualified to draw inferences than the trier of the fact. There are some subjects upon which the court is usually quite incapable of forming an opinion unassisted and others upon which it could come to an independent conclusion, but the help of an expert would be useful. See *Holtzhauzen v Roodt* 1997 3 All SA 551 (W) 555.

4 Haneef 2007 *Islamic Studies* 202. Circumstantial evidence furnishes indirect proof and requires the court to draw certain inferences because the witness made no direct assertions with regard to the fact in issue. See Schwikkard and Van der Merwe *Principles of Evidence* 23; *S v Burger* 2010 2 SACR 1 (SCA) para 26; Schmidt and Rademeyer *Law of Evidence* 4.

5 National Research Council 2009 https://www.ojp.gov/pdffiles1/nij/grants/228091.pdf (hereafter the NAS Report) *7.* In 2006 the National Academy of Sciences (NAS) was authorised to conduct a study on forensic science. The NAS subsequently established a committee to operate under the project title "Identifying the Needs of the Forensic Science Community". The NAS Report identified several factors contributing to faulty forensic science and also indicated how this influences criminal trials. In addition to this, the Report also suggested several reforms.

convictions and acquittals.[6] The most frequently explored issue in relation to expert forensic evidence is its admissibility and the principles or standards that ought to govern its admissibility.

Many jurisdictions have had difficulties with the admissibility of expert evidence in criminal proceedings,[7] mostly due to the complexity and reliability of this evidence.[8] In response to these challenges, several of these jurisdictions began developing admissibility standards to govern the admissibility of expert evidence. The most notable development of admissibility standards has occurred in the United States of America (USA).[9]

Difficulties with expert evidence are not unique to South Africa, as the country has and continues to face problems with this evidence in court.[10] South Africa's approach to the admissibility of expert forensic evidence has been described as "overly accommodating",[11] with little being done to develop admissibility standards.

The main argument put forward in this paper is that expert forensic evidence must be tested for reliability at the admissibility stage instead of leaving questions of reliability until the end of the trial, when the evidence is evaluated. In advancing this argument, the article considers the development of admissibility criteria in jurisdictions like the USA, and England and Wales. These jurisdictions operate with an adversarial system involving two parties — the prosecution and the defence.[12] The USA is considered because this jurisdiction has a more extended history with the development of admissibility standards and reform.[13] For instance, *Frye v United States*[14] and *Daubert v Merrell Dow Pharmaceuticals, Inc*[15] are

6 O'Brien, Daeid and Black 2015 *Phil Trans R Soc B* 2.

7 Meintjes-Van der Walt 2011 *SALJ* 149.

8 Meintjes-Van der Walt 2011 *SALJ* 149.

9 *NAS Report* 85-95.

10 Olckers 2013 *Forensic Science International: Genetics* 160.

11 Edmond and Meintjes-Van der Walt 2014 *SALJ* 109.

12 Griffin 2001 *Am U Int'l L Rev* 1244.

13 Koehler, Mnookin and Saks 2023 *PNAS* 1-6.

14 *Frye v United States* 293 F 1013 (DC Cir 1923). The appellant was charged with murder. At his trial the appellant attempted to call an expert witness to testify that the appellant had taken a systolic blood pressure deception test and to further testify as to the test results. The expert testimony had been held inadmissible by the lower court, which had convicted the appellant of second-degree murder. On appeal the court had to decide whether it was incorrect for the lower court to exclude the evidence. In determining this, the court established the "general acceptance" test and rendered the evidence inadmissible.

15 *Daubert v Merrell Dow Pharmaceuticals Inc* 509 US 579 (1993) (hereafter *Daubert v Merrell Dow*). *Daubert v Merrell Dow* is a USA civil case which was brought to court to determine whether or not Bendectin, an anti-nausea medication taken during pregnancy, caused birth defects. The medication which was taken by the plaintiffs during pregnancy was marketed by Merrel Dow. When the matter was first brought

considered landmark decisions insofar as developing admissibility standards for expert evidence is concerned. The main reason for choosing England and Wales is because the South African law of evidence, much like the law of evidence in England and Wales, also finds its roots in English law.[16] English law forms part of the common law of South Africa's law of evidence.[17] Therefore, just as in England and Wales, forensic evidence in South Africa will be admissible if it is relevant.[18] Developments in these jurisdictions could offer valuable lessons and guidance about developing admissibility standards to filter out unreliable forensic evidence.

This article also examines problems with expert forensic evidence presented in criminal proceedings. Using the findings regarding the unreliability of many of the forensic science methods frequently used in courts, the need to consider the reliability of this evidence when it is admitted in criminal proceedings will be explained. The objectives of this article are thus: 1) to identify the problems associated with the expert forensic evidence typically used in criminal proceedings; 2) to determine the efforts that have been made by foreign jurisdictions such as the USA, England and Wales; and 3) to suggest the reconsideration of the current admissibility standard of expert forensic evidence in South African criminal proceedings by introducing a reliability-based test in addition to the existing standard.

2 The admissibility of expert forensic evidence in South Africa

Section 210 of the *Criminal Procedure Act* 51 of 1977 (hereinafter referred to as the *CPA*) provides that:

> No evidence as to any fact, matter or thing shall be admissible which is irrelevant or immaterial and which cannot conduce to prove or disprove any point or fact at issue in criminal proceedings.[19]

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to the trial court, Merrel Dow brought expert witnesses to testify that Bendectin had been subject to intensive trials and that these trials presented no evidence of any teratogenic effects in humans. The plaintiffs (Daubert) similarly brought expert witnesses to court to counter this testimony by testifying that the drug could cause birth defects. The trial court dismissed the plaintiffs' case because of a lack of admissible scientific evidence. This decision was confirmed by the Court of Appeal. However, the decision was reversed by the Supreme Court. The Supreme Court held that the trial court had applied the wrong standard to assess the admissibility of the plaintiff's expert testimony.

16 Lewis 2005 *Amicus Curiae* 12-14.

17 *S v Desai* 1997 1 SACR 38 (W) 43*g.* In this case, DJP remarked that the South African law of evidence is part of the law which is tied to England. This was confirmed when the court held that English law is South Africa's law of evidence's main source of law. See *Savoi v National Director of Public Prosecutions* (CCT 71/13) [2014] ZACC 5 (20 March 2014) para 37.

18 Section 210 of the *Criminal Procedure Act* 51 of 1977 (hereafter the *CPA*).

19 Section 210 of the *CPA*. Also see *S v Gokool* 1965 3 SA 461 (N) 457G.

Evidence is thus admissible if it is relevant and can assist the court with the issue in dispute.[20] In *Gentiruco AG v Firestone SA (Pty) Ltd*[21] the Supreme Court of Appeal of South Africa held that the true test governing the admissibility of expert evidence is whether the court can receive appreciable help from the expert's opinion. Admissibility is also concerned with whether the evidence was submitted in accordance with the rules of evidence.[22] That is, whether the evidence is relevant and acceptable. Satchwell J in *Holtzhauzen v Roodt*[23] held that whenever experts are called to assist the court, the admissibility principles are as follows: firstly, the expert must give evidence on matters calling for specialised skill or knowledge; secondly, the court should not elevate the expertise of the witness to such an extent that it loses sight of its own capabilities and responsibilities; thirdly, whether the witness is qualified as an expert; and fourthly, the expert opinion must be corroborated by admissible evidence. The admissibility of the evidence is determined on a case-by-case basis with very few restrictions on the types of expert evidence that may be admitted.[24]

At the admissibility stage courts are not concerned with assessing reliability. This position was confirmed in *Nduna v S,*[25] where the court stated that evidence is admissible only if relevant to an issue in dispute. Once expert forensic evidence has been admitted, presiding officers must evaluate it and attach weight to it.[26] The evaluation of evidence, including expert evidence, is a process by which presiding officers deliberate the weight of the evidence.[27] At this stage presiding officers establish the reliability and validity of expert evidence.[28] This means that the reliability and quality of the evidence are determined at the end of the trial as opposed to being determined at the admissibility stage.[29] The obvious risk with admitting unreliable forensic evidence is that more weight might be assigned to the evidence,[30] which could lead to an unfair trial outcome and a miscarriage of justice.

The admissibility of expert forensic evidence in South Africa can be compared with the position in other common law jurisdictions like the USA, and England and Wales. In the USA, for instance, strict criteria for the admissibility of expert evidence are applied to exclude unreliable forensic

20 *S v Gokool* 1965 3 SA 461 (N) 457G.
21 *Gentiruco AG v Firestone SA (Pty) Ltd* 1972 1 SA 589 (A).
22 Skorupka 2021 *Revista Brasileira de Direito Processual Penal* 94.
23 *Holtzhauzen v Roodt* 1997 3 All SA 551 (W).
24 Edmond and Meintjies-Van der Walt 2014 *SALJ* 111.
25 *Nduna v S* (076/10) 2010 ZASCA 120 (30 September 2010).
26 Visser and Kruger 2018 *SACJ* 2.
27 De La Rey *Fact-Finding Process* 38.
28 Meintjies-Van der Walt 2008 *SACJ* 26.
29 Visser and Kruger 2018 *SACJ* 4.
30 Maxwell "Preventing Miscarriages of Justice" 1.

evidence; this is done before it is left to the jury to evaluate this evidence.[31] The question of the reliability of the evidence is not left until the end of the trial, as is the case in South Africa. England and Wales have followed the USA's approach by developing stricter admissibility criteria to exclude unreliable forensic evidence.[32] In its report published in 2009 the England and Wales Law Commission found that clear and practical rules addressing the reliability of forensic evidence at the admissibility stage are more likely to ensure the admission of reliable forensic evidence than no rules at all.[33] It is therefore argued that the absence of criteria to test the reliability of forensic evidence at the admissibility stage may allow the admission of unreliable evidence.

3 The problem of expert forensic evidence

There are several problems associated with expert forensic evidence, which include:

> accreditation, the regulation of the forensic science profession, continued education, the training of court officials, quality assurance, biased testimonies, the lack of transparency with regard to the processes and procedures followed in the forensic community, incorrect interpretation of forensic evidence, lack of scientific knowledge, awareness by the legal profession and over-emphasis on the prosecuting perspective.[34]

Some of these challenges have been addressed in some jurisdictions by adopting stricter admissibility criteria. However, South Africa has not actively participated in developing such criteria and continues to admit expert forensic evidence using traditional admissibility standards.

3.1 Lack of reliability of frequently used forensic science methods

3.1.1 The definition of reliability

Reliability refers to the ability of the evidence to determine the truth.[35] It has to be shown that the evidence is based on reliable principles and methods that an expert has reliably applied.[36] According to the United States Court in *Daubert v Merrel Dow Pharmaceuticals Inc*,[37] the scientific definition of reliability concerns the application of a method and whether this produces consistent results.[38] Scientific reliability can be contrasted with evidentiary

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31 *Daubert v Merrell Dow* 597. The court in *Daubert* also tasked judges with a "gatekeeper" role at the admissibility stage.

32 Edmond and Roach 2011 *UTLJ* 374.

33 The Law Commission *Admissibility of Expert Evidence* 46.

34 Olckers 2013 *Forensic Science International: Genetics* 160.

35 Thompson 2012 *SMU L Rev* 604.

36 *PCAST Report* 42. Courts must be satisfied that the methods were used to support certain theories or hypotheses. See Saks and Faigman 2008 *Annu Rev Law Soc Sci* 151.

37 *Daubert v Merrell Dow* 590 n9.

38 *Daubert v Merrell Dow* 590 n9.

reliability, which refers to the trustworthiness of the evidence, where such reliability will be based on scientific validity.[39] The reliability of scientific evidence should be proof of validation.[40] Thus, whether the principles relied upon support what they intend to show.[41] This article is concerned with evidentiary reliability. Therefore, reliability (evidentiary reliability) within the context of expert forensic evidence is concerned with a method's validity.

3.1.2 An overview of frequently used forensic science methods and the reliability thereof

3.1.2.1 Bitemark analysis

In 2009 the NAS Report[42] indicated the existence of problems with bitemark analysis, which included the lack of studies verifying the uniqueness of bitemarks and the tendency of bitemarks on the skin to be distorted or to change over time. In a similar vein, the PCAST Report[43] rejected bitemark analysis as a scientifically valid method. The report acknowledged that few empirical studies had been conducted studying examiners' ability to accurately identify the source of a bitemark.[44] Out of the studies conducted, the false positive rates were so high that the method is deemed scientifically unreliable.[45]

3.1.2.2 Latent fingerprint analysis

Fingerprint analysis has been a valuable tool in establishing a person's guilt but also in demonstrating another's innocence.[46] It has been recognised as a relatively reliable method, but it also has its own shortcomings. According to the NAS Report, it is plausible that a comparison between two impressions could accurately reveal whether or not these are derived from

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39 *Daubert v Merrell Dow* 590 n9.

40 Maxwell "Preventing Miscarriages of Justice" 5.

41 Garrett and Fabricant 2018 *Fordham L Rev* 1565.

42 NAS Report 175. The NAS was authorised to conduct a study on forensic science and identify improvements that were needed to ensure the reliability of the science. The recommendations made in the report cover among other things recommendations related to forensic science disciplines, the admission of forensic science evidence in litigation and improving the methods, practices, and performances in forensic science, ultimately to improve its reliability in fact-finding.

43 PCAST Report 87. Bitemark analysis examines marks left on a victim or object by comparing those marks with dental impressions taken from a suspect. PCAST Report 83.

44 PCAST Report 87.

45 PCAST Report 87.

46 NAS Report 142. Fingerprint analysis is known as "friction ridge analysis". It consists of experienced-based comparisons of impressions left by the ridge structures of hands on surfaces. Friction ridge analysis is an example of what the forensic science community uses as a method for assessing "individualisation", which is the conclusion that a piece of evidence (in this case a pattern left by friction ridges) comes from a single unambiguous source. See NAS Report 136.

the same source.[47] The PCAST Report notes, however, that serious efforts have begun to be made to establish the scientific foundation of this evidence, including measuring accuracy, defining the quality of latent fingerprints, studying the reasons advanced for error rates, and so forth.[48] The report also notes that the method is prone to false positives, likely higher than expected.[49] It therefore recommended that conclusions about this evidence need to be accompanied by information about reliability and false positive rates.[50]

South African courts believe that fingerprint evidence is a matter that must be left to the experts.[51] Therefore, it would be unnecessary for the court to see the points of similarity as indicated. Instead, the court asks whether it can trust and rely on the statements and opinions of the expert.[52]

3.1.2.3 Firearm analysis

When it comes to firearm analysis, there is little that is known about the variabilities among individual tools and guns, which makes it difficult to specify how many points of similarity are necessary for any given level of confidence in the results.[53] An insufficient number of studies has been conducted to establish the reliability and repeatability of the method.[54] Even though this method is routinely admitted in criminal courts, this does not mean that it is without flaws. This method, for instance, lacks objective standards for examining firearms, and it is recommended by the PCAST Report that there is a need for the development of objective methods similar to those used in DNA analysis.[55]

3.1.2.4 Hair analysis

The reason for using hair analysis as forensic evidence is rooted in the fact that human and animal hairs are frequently shed and can thus be transferred from an individual to a crime scene and from the crime scene to an individual.[56] According to the NAS Report, this method is "highly

47 NAS Report 142.
48 PCAST Report 95.
49 PCAST Report 101.
50 PCAST Report 102-103.
51 *S v Nala* 1965 4 SA 360 (A); *S v Malindi* 1983 4 SA 99 (T).
52 *S v Malindi* 1983 4 SA 99 (T) 104C-D.
53 NAS Report 154. In firearms analysis an attempt is made by examiners to determine whether ammunition is or is not associated with a specific firearm based on tool-marks produced by guns on the ammunition. This discipline is based on the idea that the tool-marks produced by different firearms vary enough to allow components of fired cartridges to be identified with particular firearms. See PCAST Report 104.
54 NAS Report 154.
55 PCAST Report 125-129.
56 NAS Report 156. Footwear analysis is known as "impression evidence". This type of evidence exists when an object such as a shoe leaves an impression at the crime scene or on another object or a person. A shoeprint is a two-dimensional type of

unreliable" because there are no scientifically accepted statistics about the frequency with which particular characteristics of hair are distributed in a population.[57] There are also no studies about whether environmental changes found in particular fibres are distinctive enough to reliably individualise their source, and there have also been no studies that characterise either the reliability or the error rates of the procedures used.[58]

3.2 Expert forensic evidence and wrongful convictions: lessons for South Africa

Wrongful convictions can occur due to a series of events, from the commission of a crime to the trial.[59] Various authors have studied wrongful convictions,[60] and faulty forensic science is among the many factors contributing to their occurrence.[61] Wrongful convictions due to faulty forensic evidence are caused when an expert witness provides improper testimony or when the evidence is based on incorrect theories.[62] Testimony can be improper when an expert, for instance, provides the court with an incorrect interpretation of the facts.

As in many jurisdictions, wrongful convictions are a reality in South Africa. However, this reality remains mostly unacknowledged, ignored or sometimes even denied.[63] This ignorance is probably caused by the absence of an entity responsible for recording and tracking the number of wrongful convictions over the years. Neither the National Prosecuting Authority (NPA) nor the Department of Justice and Correctional Services keeps records of the rate of wrongful convictions.[64] According to Visser and Scholtz,[65] South African researchers and policymakers have yet to determine the cause of wrongful convictions and how to address the issue.

The Wits Justice Project[66] has suggested that the occurrence is far more widespread than believed. Even though there are no records of wrongful convictions, and in particular, records on forensic evidence as one of the causes of such convictions, there are cases that have illustrated the role that forensic evidence plays in fact-finding errors. Different cases reveal instances where accused persons could have been wrongfully convicted

impression and is a common type of evidence examined by forensic examiners. See NAS Report 145.

57 NAS Report 160.

58 NAS Report 163.

59 Colvin 2009 *Criminal Law Forum* 181-182.

60 Garrett 2020 *Annu Rev Criminol* 251.

61 NAS Report 4.

62 Bonventre 2021 *WIREs Forensic Science* 1.

63 Raphaely 2018 https://www.dailymaverick.co.za/article/2018-10-02-getting-it-wrong-guilty-until-proven-innocent/.

64 Wits Justice Project 2014 https://static.pmg.org.za/160920witsjustice.pdf.

65 Visser and Scholtz 2023 *AJICL* 538.

66 Wits Justice Project 2014 https://static.pmg.org.za/160920witsjustice.pdf.

due to unreliable expert forensic evidence. For example, in *S v Nthati*[67] the court admitted that it would have accepted the state's forensic evidence as reliable and, consequently, convicted the accused based on the evidence if the defence had not drawn the court's attention to the errors in the state's evidence. In *S v Phiri*[68] the High Court addressed the irregularities in the hearing in the *court a quo* alongside the shortcomings of the DNA evidence. It held that these destroyed the legal validity of the accused's trial, subsequently found the accused not guilty and discharged him.

The USA identified the misapplication of forensic science as the second most common factor contributing to wrongful convictions.[69] Many of these wrongful convictions stem from unreliable or invalid forensic methods, misleading testimony, and mistakes in applying forensic methods.[70] Garrett[71] conducted a study on wrongful convictions in the USA and found that in most cases forensic evidence had been improperly used to secure a conviction against the accused. For instance, in *Commonwealth v Cowans*[72] fingerprint identification was used to convict the accused, but DNA evidence later exonerated him. Similarly, in *State v Krone*[73] bitemark analysis led to the wrongful conviction of the accused person, but ten years later DNA evidence exonerated the accused.

There have also been instances where faulty forensic evidence led to wrongful convictions in England and Wales. For example, the Law Commission's Consultation Paper[74] references the *R v Dallagher*[75] and *R v Clark*[76] cases to demonstrate the ongoing problem with wrongful convictions due to forensic evidence. Faulty forensic evidence was admitted in both cases, leading to both accused persons' wrongful convictions. In its

67 *S v Nthati* 1997 1 SACR 90 (O) 94E-F.

68 *S v Phiri* (CC512/2007) [2007] ZAGPHC 337 (4 December 2007). With regard to the DNA evidence, reference was made to a female's undergarment (her panties). The High Court found that there were three reference numbers to the same undergarment of the complainant. The question which immediately arose was which one of the three was the correct one. The court found that the *court a quo* had not captured these discrepancies in numbering.

69 Innocence Project 2025 https://innocenceproject.org/misapplication-of-forensic-science/.

70 Innocence Project 2025 https://innocenceproject.org/misapplication-of-forensic-science/. In 1992, American attorneys Peter Neufeld and Berry Scheck established the Innocence Project at Cardozo Law School as a legal clinic to expose miscarriages of justice by using post-conviction DNA testing.

71 Garrett 2008 *Col L Rev* 81.

72 *Commonwealth v Cowans* 756 NE 2D 622 (Mass App Ct 2001). Also see *Williamson v State* 812 P 2d 384 (Okla Crim App 1991), where the court held that evidence based on microscopic hair analysis was "irrelevant, imprecise and speculative and its probative value was outweighed by its prejudicial effect".

73 *State v Krone* 897 P 2d 621 (Ariz 1995).

74 The Law Commission *Admissibility of Expert Evidence* 10-11.

75 *R v Dallagher* [2002] EWCA Crim 1903, [2005] 1 Cr App R.

76 *R v Clark* [2003] EWCA Crim 1020, [2003] 2 FCR 447.

subsequent report on expert evidence in England and Wales,[77] the Commission held that if the proposed statutory test for admissibility emphasising testing reliability had been in place, the prosecution would not have allowed the evidence to be tendered for admission.[78] It was also held that this test would have led experts, legal practitioners and judges to scrutinise it for reliability more effectively before the trial; that is, before deciding on the admissibility of the evidence.[79]

3.3 Inadequacy of traditional trial safeguards

South African criminal courts have been described as unwilling to develop new admissibility criteria. This unwillingness can be attributed to the courts' belief that traditional trial safeguards such as cross-examination, the rebuttal of expert evidence, and the adequate evaluation of the evidence at the end of the trial are sufficient in ensuring the reliability of the evidence.[80] However, the question that must be asked is whether these trial safeguards are sufficient to filter out unreliable forensic evidence. According to Edmond,[81] few empirical studies support the contention that the safeguards are efficient, and in practice, their effectiveness is just a possibility.

Studies have revealed that cross-examination may be ineffective in assessing the strengths and weaknesses of expert evidence or in exposing weaknesses in the methodology used by the expert.[82] It is important to note that the effectiveness of cross-examination is largely dependent on the skill of the cross-examiner and whether the cross-examiner has the necessary knowledge of forensic evidence and the skill to cross-examine an expert witness. A lack of knowledge of forensic evidence will thus restrict a cross-examiner's ability to cross-examine an expert witness effectively[83] and expose potential weaknesses of the expert evidence, methodological weaknesses or flawed conclusions. A skilled expert witness with vast knowledge and experience can further exacerbate a defence lawyer's task of cross-examination. Such a witness is normally adequately prepared for cross-examination and can appear impartial and unbiased when giving expert testimony,[84] making it difficult for the lawyer to expose potential flaws in the testimony.

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77 The Law Commission *Admissibility of Expert Evidence* 15.
78 The Law Commission *Admissibility of Expert Evidence* 15.
79 The Law Commission *Admissibility of Expert Evidence* 15.
80 Edmond and San Roque 2012 *CICJ* 51-53.
81 Edmond 2010 *Australian Journal of Forensic Sciences* 83-89. Also see McQuiston-Surrett and Saks 2009 *Law and Human Behavior* 436-439.
82 Edmond and San Roque 2012 *CICJ* 51, 55; and McQuiston-Surrett and Saks 2009 *Law and Human Behavior* 439.
83 Meintjes-Van der Walt 2001 *SAJHR* 315.
84 Edmond and San Roque 2012 *CICJ* 56. Also see Meintjes-Van der Walt 2001 *SAJHR* 317.

Like cross-examination, calling a defence expert witness is vital in challenging the prosecution's evidence.[85] Securing a suitable expert witness is the responsibility of the defence attorney. Even if the attorney manages to secure such a witness, there is no guarantee that the witness is in fact suitable or competent.[86] On the other hand, the prosecution is usually assured of securing the services of suitably qualified and experienced expert witnesses.[87] In addition, it may also be difficult and expensive for the defence to obtain the services and expertise of an expert.[88] The ability of the defence to call an expert witness is generally limited due to a lack of resources to call such a witness for the purpose of revealing inadequacies in the expert evidence of the prosecution through rebuttal.[89]

4 Trends in foreign jurisdictions aimed at filtering out unreliable expert forensic evidence

4.1 The United States of America

Advances in the scientific domain have prompted the decision to improve the admissibility requirements for expert forensic evidence in USA courts.[90] Changes were seen in judgments like *Frye v United States,*[91] where the "general acceptance" test was created as a prerequisite for the admissibility of expert forensic evidence. In terms of this test, evidence will be admissible only if the technique used to analyse the evidence is generally accepted as reliable in the relevant scientific community.[92] After much debate about whether this test actually amounted to a suitable new standard for the admissibility of forensic evidence, the United States Supreme Court, in interpreting Rule 702, made a landmark ruling in *Daubert v Merrell Dow Pharmaceuticals*.[93] In *Daubert*[94] the court held that Rule 702 of the *Federal Rules of Evidence* already established reliability as a prerequisite for the admissibility of expert scientific testimony and superseded *Frye* as the standard for the admissibility of forensic evidence. Even though *Daubert* is considered a landmark decision, it is binding only on federal courts.[95] In fact, only a few states in the USA chose to adopt the *Daubert* standard, with some choosing to retain the *Frye* standard.[96]

85 Meintjes-Van der Walt 2001 *SAJHR* 309.
86 Meintjies-Van der Walt 2001 *SAJHR* 313.
87 Meintjies-Van der Walt 2001 *SAJHR* 313.
88 *Honeysett v The Queen* (2014) 253 CLR 122.
89 Edmond and San Roque 2012 *CICJ* 56-57.
90 PCAST Report 40.
91 *Frye v United States* 293 F 1013 (DC Cir 1923) para 1014.
92 *Frye v United States* 293 F 1013 (DC Cir 1923) para 1014.
93 PCAST Report 41.
94 *Daubert v Merrell Dow* 579-580.
95 Bernstein and Jackson 2004 *Jurimetrics* 5.
96 Bernstein and Jackson 2004 *Jurimetrics* 1-6.

When the court confirmed the "reliability" test as a prerequisite for the admissibility of expert testimony, it also determined that presiding officers must be the "gatekeepers" of justice.[97] According to the Supreme Court, Rule 702 requires an expert's testimony to be based on a reliable foundation and relevant to the trier of facts.[98] The court also identified five factors that should be considered whenever a court evaluates the reliability of evidence. These factors include:[99]

1. Whether the theory or technique can be (and has been) tested.
2. Whether the theory or technique has been subjected to peer review and publication.
3. The known or potential rate of error of a particular scientific technique.
4. The existence and maintenance of standards controlling the technique's operation.
5. A scientific technique's degree of acceptance within a relevant scientific community.

The idea behind *Daubert* was to bring reliable forensic evidence into court by adopting criteria for the admissibility of this evidence.[100] These reliability criteria were later supported and endorsed in both *General Electric v Joiner*,[101] and *Kumho Tire v Carmichael*.[102] Therefore, when determining the reliability of expert evidence in criminal courts in the USA, the courts need to consider whether the expert's scientific technique or theory has been tested. This also has to be accompanied by evidence of the error rates of the particular technique or theory. The technique also has to be accepted within the relevant community, meaning that experts in the same field also have to rely on the same technique or theory to obtain certain scientific results. The test for reliability, therefore, in this sense, questions the origin of the results and whether such can be deemed trustworthy to assist a fact-finder in deciding the case.

The USA offers comprehensive coverage of forensic science evidence, particularly its treatment in court. Undoubtedly there have been some major developments in developing standards to ensure the reliability of forensic evidence in court. The USA's standards for the admissibility of forensic evidence have influenced the development of admissibility standards for this type of evidence in other jurisdictions as well.[103]

97 *Daubert v Merrell Dow* 579.
98 *Daubert v Merrell Dow* 580. See NAS *Report* 90.
99 *Daubert v Merrell Dow Pharmaceuticals Inc* 509 US 579 (1993) 580.
100 Young and Goodman-Delahunty 2021 *Psychological Injury and Law* 305.
101 *General Electric Co v Joiner* 522 US 136 (1997).
102 *Kumho Tire Co v Carmichael 526 US 137 (1999).*
103 Olaborede and Meintjes-Van der Walt 2020 *PELJ* 8.

4.2 England and Wales

In 2011 the Law Commission[104] proposed that there should be a new reliability-based admissibility test for expert evidence, which would apply to most expert evidence presented in criminal proceedings.[105] According to the Law Commission, the need to reform the admissibility standards of expert evidence was prompted after it was found that expert evidence was admitted in criminal proceedings too readily and with insufficient scrutiny.[106] The Law Commission[107] recommended incorporating a legislative provision in primary legislation to determine that expert evidence would be admissible if it is sufficiently reliable and set out the test of "sufficient reliability".[108] The proposal to enact the Law Commission's draft Bill was declined due to a lack of certainty regarding the additional costs that could possibly be incurred.[109] However, the Criminal Procedure Rule Committee considered amendments to the Criminal Procedure Rules, which led to amendments to Criminal Procedure Rules (CrimPR) Part 33, now CrimPR Part 19, in combination with the making of new Criminal Practice Directions (CrimPD) Part 33A, now CrimPD Part 19.[110]

Criminal Procedure Rule Part 19 contains several provisions relevant to expert evidence.[111] CrimPD 19A.4 extracts from the judgment *R v Dlugosz*,[112] wherein it was held that:

> It is essential to recall the principle that is applicable in determining the issue of admissibility; the court must be satisfied that there is a sufficiently reliable scientific basis for the evidence to be admitted. If there is, then the court leaves the opposing views to be tested before the jury.

CrimPD 19A.5[113] goes on to list factors that the court may consider in determining the reliability of the expert evidence. These factors are:[114]

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104 The Law Commission was established in terms of the *Law Commission Act*, 1965 for the purpose of promoting the reform of the law. The report followed after a consultation published by the Commission. In the report the Commission sets out and explains certain recommendations for reforming the law governing expert evidence in criminal proceedings. The decision to address the law on expert evidence was prompted by a call for reform from the House of Commons' Science and Technology Committee. See The Law Commission *Expert Evidence in Criminal Proceedings* iii and 1.

105 The Law Commission *Expert Evidence in Criminal Proceedings* 8.

106 The Law Commission *Expert Evidence in Criminal Proceedings* 1.

107 The Law Commission *Expert Evidence in Criminal Proceedings* 138

108 The Law Commission *Expert Evidence in Criminal Proceedings* 138.

109 Stockdale and Jackson 2016 *JCL* 344.

110 Stockdale and Jackson 2016 *JCL* 344.

111 Stockdale and Jackson 2016 *JCL* 352.

112 *R v Dlugosz* [2013] 1 Cr App R 32 para 11.

113 *Criminal Practice Directions* (2015) 19A.5.

114 *Criminal Practice Directions* (2015) 19A.5.

1. The extent and quality of the data on which the expert opinion is based, as well as the methods that were used.
2. If the opinion is based on an inference, whether the opinion properly explains how safe or unsafe the inference is.
3. If the opinion is based on the results of the use of any method, whether the opinion takes proper account of the matters.
4. The extent to which the material forming the basis of the expert's opinion has been reviewed by others with the relevant expertise.
5. The extent to which the expert's opinion falls outside the expert's field of expertise.
6. The completeness of the information that was available to the expert and whether the expert considered all information to arrive at the opinion.
7. Whether there is a range of expert opinions on the matter, and if there is such a range, whether the expert's preference has been properly explained.
8. Whether the opinion of the expert followed established practice methods, and if they were not followed, whether the reason for such diversion was properly explained.

Stockdale and Jackson[115] are of the view that until the Court of Appeal takes the time to further consider reliability within the framework of the amendments to Part 19 of the Criminal Procedure Rules and Criminal Practice Directions 19A, it is difficult to make predictions about the extent to which the court will use the opportunity to develop the common law reliability test. England and Wales, unlike South Africa, have made efforts to develop admissibility standards to better gauge the reliability of expert forensic evidence. Even though these efforts did not yield the desired results, they nonetheless highlighted the importance of alerting courts to the possibility that forensic evidence might be unreliable.

5 A clarion call: developing admissibility standards to test reliability

Having considered the current accommodating approach to the admissibility of expert forensic evidence in criminal cases in South Africa, the problem of the reliability of forensic evidence, and the developments made in foreign jurisdictions, at this juncture the paper seeks to determine a way forward for South Africa.

According to Edmond,[116] current practices related to judging the admissibility of expert forensic evidence are unsatisfactory and are in need of reform. The author suggests that when reform of this kind is suggested,

115 Stockdale and Jackson 2016 *JCL* 362.
116 Edmond 2012 *International Journal of Evidence and Proof* 41.

attention should be given among other things to the unreliability of some of the methods of forensic science established by the NAS Report, and the wrongful convictions that have occurred due to the application of unreliable forensic science methods.[117]

The obvious response is that a reliability-based standard should be established to accompany the current relevance standard. This is not to suggest that courts do away with relevance as a standard, but instead to suggest that courts consider reliability in addition to relevance. Canadian Justice, Justice Sopinka, correctly stated that the concept of relevance is broad enough to encompass an assessment of reliability.[118] Therefore establishing reliability could be a composite of the relevance test, but it would go a step further by requiring the establishment of reliability accompanied by necessary guidelines to assist courts in determining such reliability.

In the process of establishing reliability the expert should at the very least furnish the criteria for testing the accuracy and objectivity of his/her opinion.[119] Giannelli holds that the reliability of forensic evidence depends on three factors, which are:[120]

1. the validity of the underlying principle;
2. the validity of the technique applying that principle;
3. the proper application of the technique on a particular occasion (this is regarding an examination of the functioning of any instrument employed in the technique to ensure the accuracy of results, adherence to the correct procedures, and qualification of experts conducting the procedure and/or interpreting the results).

Similarly, the *Federal Rules of Evidence*[121] require that expert evidence be based on "reliable principles and methods" that have been "reliably applied" to the facts of the case. In *Daubert v Merrel Dow Pharmaceuticals Inc*[122] the court held that judges must determine "whether the reasoning or methodology underlying the testimony is scientifically valid". The Supreme Court in *Daubert*[123] also held that pragmatic flexibility rather than normative scientific rigidity should guide the trial court's inquiry into reliability and stated that the guidelines outlined do not represent a definitive checklist. Furthermore, in *Kumho* the court advised that:

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117 Edmond 2012 *International Journal of Evidence and Proof* 41.
118 *R v Mohan* 1994 2 SCR 9 paras 22-23.
119 *S v Mkhize* 1998 2 SACR 478 (W) 16.
120 Giannelli 1980 *Col L Rev* 1197-1250.
121 *Federal Rules of Evidence Rule 702: Testimony by Expert Witnesses* (Act 2 of 1975).
122 *Daubert v Merrell Dow* para 592.
123 *Daubert v Merrell Dow* para 593.

> the law grants a district court the same broad latitude when it decides how to determine reliability as it enjoys with respect to its ultimate reliability determination.[124]

Additionally, the court stated that the trial court possesses great discretion in determining whether the Daubert factors are a reasonable measure of reliability in each court.[125] These determinations by both courts make it clear that a rigid test, with standard and inflexible criteria, is not desirable when determining reliability. It should be accepted that the criteria are meant to guide this determination. In this sense these criteria could be endorsed in South African criminal courts, since the courts would not be bound by a specific standard that has to be applied exactly as it is in every case. Such an approach would in all likelihood be unattainable due to the vast number of forensic science techniques that courts deal with. Testing the reliability of this evidence would be based on two main considerations, the first being the method applied in analysing the evidence and whether it was reliably applied, and the second being the interpretation of the results and whether these were reliably interpreted and applied to the facts of the case.

The following proposed guidelines could be used by courts to determine the reliability of expert forensic evidence. The court could require the expert witness to establish the following when adducing evidence of a scientific nature:

(a) The method — this is concerned with the scientific method relied upon by the expert and whether it is accepted within the relevant scientific community as valid and reliable. The acceptance of the technique would be established by evidence of the publication of the validity and applicability of the method.

(b) The application of the method — this is concerned with whether the expert reliably applied the method when analysing the evidence.

(c) Peer review — this is related to whether the method has been peer-reviewed. According to a survey[126] conducted in the USA among judges of cases wherein the assessment of expert evidence was considered, most of them indicated that they considered peer review to be a "very useful" guideline for determining the reliability of expert evidence. They also held that there was a high likelihood of rejecting expert evidence that had not been subjected to rigorous peer review.[127] A peer review would subsequently reveal any defects in the method used.

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124 *Kumho Tire Co v Carmichael 526 US 137 (1999)* para 142.
125 *Kumho Tire Co v Carmichael 526 US 137 (1999)* para 152.
126 Gatowski *et al* 2001 *Law and Human Behavior* 433-447.
127 Gatowski *et al* 2001 *Law and Human Behavior* 447.

(d) Interpretation of results — this relates to the expert's interpretation of the results and whether his/her assertions about the results were scientifically valid.

6 Conclusion

Forensic science is a highly specialised field that requires special attention. The nature of this evidence demands that there be specialised rules aimed at evaluating the evidence to ensure that the most accurate evidence is admitted in court. Unfortunately, courts have generally played an inconsistent and ineffective role in supervising and evaluating forensic scientific evidence, which has not assisted in responding to the crisis associated with forensic evidence.[128] The most important observation that has been made regarding the admission of evidence is that forensic evidence is admitted under most circumstances without much consideration of the foundational research and accuracy of this evidence.[129]

In *Holtzhauzen v Roodt*[130] it was held that since expert evidence is likely to carry more weight than other evidence, higher standards of accuracy and objectivity and accuracy should be required. However, no guidelines exist to determine how these higher standards should be applied. Justice Maxwell[131] holds that establishing the reliability of forensic evidence is imperative to upholding the fairness of the trial. In the absence of this, what could result is the placing of undue weight on forensic evidence, which is demonstrably unreliable. Reliability promotes the accuracy of the outcome of the trial.[132] For this reason, it is important for South African criminal courts to closely evaluate the scientific reliability of forensic evidence before admitting such evidence.

Edmond[133] advises that reform could be made possible by a change of culture, which would occur if judges and attorneys began to understand why traditional practices are inadequate and developed an ability and willingness to change.[134] He also advises that reform could be justified by advancing reasons based on the need for reliable forensic evidence to be brought into court.[135] Exploring all avenues available for such development is important in developing standards to ensure that the forensic evidence received in court is reliable.

128 Edmond *et al* 2013 *U Denv Crim L Rev* 32.
129 Edmond *et al* 2013 *U Denv Crim L Rev* 31.
130 *Holtzhauzen v Roodt* 1997 3 All SA 551 (W).
131 Maxwell "Preventing Miscarriages of Justice" 642.
132 Thompson 2012 *SMU L Rev* 604.
133 Edmond 2012 *International Journal of Evidence and Proof* 40.
134 Edmond 2012 *International Journal of Evidence and Proof* 40.
135 Edmond 2012 *International Journal of Evidence and Proof* 40.

This article has clarified that certain kinds of traditional forensic evidence frequently used in court lack reliability and continue to be used. In justifying the need for reform, the occurrence of wrongful convictions due to unreliable forensic evidence has also been discussed. This discussion has revealed that there is a link between wrongful convictions and unreliable forensic evidence. This relationship warrants attention, and suggests that there is a need to determine what can be done to limit the occurrence of such wrongful convictions. Unfortunately, these problems with forensic evidence methods are rarely addressed and effectively dealt with in South African criminal courts, while international trends consistently show the making of conscious efforts to address this problem. Foreign jurisdictions such as the USA and England and Wales have made significant efforts to develop rules to scrutinise the reliability of the expert forensic evidence proffered in court. It now becomes imperative for South Africa, too, to join the conversation and keep abreast of these developments.

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List Of Abbreviations

AJICL	African Journal of International and Comparative Law
Alb L Rev	Albany Law Review
Am U Int'l L Rev	American University International Law Review
Annu Rev Criminol	Annual Review of Criminology
Annu Rev Law Soc Sci	Annual Review of Law and Social Science
CICJ	Current Issues in Criminal Justice
Col L Rev	Columbia Law Review
CPA	Criminal Procedure Act 51 of 1977
Fordham L Rev	Fordham Law Review
JCL	Journal of Criminal Law
NAS	National Academy of Sciences
PCAST	President's Council of Advisors on Science and Technology
PELJ	Potchefstroom Electronic Law Journal
Phil Trans R Soc B	Philosophical Transactions of the Royal Society B
PNAS	Proceedings of the National Academy of Sciences of the United States of America
SACJ	South African Journal of Criminal Justice
SAJHR	South African Journal on Human Rights
SALJ	South African Law Journal
SMU L Rev	SMU Law Review
U Denv Crim L Rev	University of Denver Criminal Law Review
UTLJ	University of Toronto Law Journal