How far has technology invaded the criminal justice system?

The Honourable Justice G C Martin AM

1. Apprehension of Offenders

- Covert operations
- "Poisoned fruit" and the exclusion of evidence

2. DNA Evidence - Evidence used to Convict

- Reliability of DNA evidence

3. Artificial Intelligence and Sentencing

- Sentencing by algorithms

When I started in practice, about 40 years ago, the courts did not have any computers, manual typewriters were still used in the Magistrates Court to record evidence, and a few more years were to pass before an early-acquiring barrister purchased a computer. He had to swap 6" floppy disks in and out to do even the simplest task. The Queensland Police had started experimenting with the use of computers in the mid '70s to create useful data on things such as criminal statistics and stolen vehicles.

So much has happened in the last four decades that I have had to confine this presentation to three aspects – events which occur before a criminal trial, during the trial, and after the trial.

I am going to take you on a brief tour of some aspects of the technology used for apprehension, providing evidence, and sentencing. And each of them is unsettled in the sense that there is some controversy about their application or use.

1) Apprehension of Offenders: Undercover on the internet

Introduction

1. Recently, police went "undercover" on an online dating phone application. The specific application only allowed persons over the age of 18 to join. Police signed up as someone over 18. After receiving communication from a person, police described their "character" as a fourteen year old child to an interested party, who seemingly disregarded this information and proceeded to plan a meeting. That person was arrested and charged with the offence of using the internet to procure a child under 16.

2. These types of operations are now routine practice by police. It is taking "undercover cop" from the physical world to the virtual world. With our lives increasingly dominated by technology, these kinds of operations will only increase in prevalence. Our virtual worlds are now closely monitored.

3. I will begin by outlining the legislative schema behind these controlled operations, before turning to certain evidentiary issues that have arisen as a consequence.

The Law in Queensland

4. Undercover operations and covert investigative techniques have long been a part of law enforcement. Before legislative regulation, the common law provided law enforcement officers no exceptional authority to participate in offences for investigative purposes.

5. In *Ridgeway v The Queen* (1995) 184 CLR 19, the offender was convicted for the possession of a trafficable quantity of heroin after an undercover "sting" operation involving police in both Malaysia and Australia. Ridgeway contested the admissibility of evidence obtained by virtue of the covert investigative techniques adopted by the police.

6. The High Court noted at 37 that: "…the effective investigation by police of some types of criminal activity may necessarily involve subterfuge, deceit and intentional creation of the opportunity for the commission by the suspect of a criminal offence." The Court was evidently aware that such activities were routine practice for police.

7. Nevertheless, the Court was adamant that such practices be regulated by Parliament:

> "…it is arguable that a strict observance of the criminal law by those entrusted with its enforcement undesirably hinders law enforcement. Such an argument must, however, be addressed to the Legislature and not the courts."[1]

8. The High Court therefore excluded the evidence obtained by the controlled operation, a decision grounded in the common law discretion to exclude on the basis of public policy.

9. *Ridgeway* acted as a catalyst for the enactment of certain provisions permitting and regulating the use of these controlled operations.

10. In Queensland, Chapter 10 of the *Police Powers and Responsibilities Act* 2000 (Qld) provides for the granting of authorities by persons for the conduct of "controlled activities". Controlled activities are described as "low-level investigations in which a police officer will conceal his or her identity as an officer for the purpose of witnessing an offender commit an offence." [2]

11. Similarly, Chapter 11 of the Police Powers and Responsibilities Act 2000 (QLD) provides for the granting of authorities by persons for the conduct of "controlled operations".

12. These provisions are confined to the investigation of serious crime, carrying a prison term of seven years or more.

13. The "controlled operations" conducted by police are seen as a "…necessary part of the law enforcement armoury" and the use of such operations are considered "…a valuable tool in the fight against major and organised crime." These undercover operations are "the only means of obtaining evidence in some cases." [3]

14. Pursuant to section 229, a "controlled operation" means an operation that is conducted for the purpose of obtaining evidence that may lead to the prosecution of a person for a relevant offence, and which may involve "controlled conduct". Importantly, "controlled conduct" means conduct for which a person would, apart from the Act, be criminally responsible.[4]

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[1] (1995) 184 CLR 19, at 43-44.
[2] Queensland, *Parliamentary Debates*, Legislative Assembly, 17 May 2000, 1083 - 1088 (T A Barton).
[3] Queensland, *Parliamentary Debates*, Legislative Assembly, 17 May 2000, 1083 - 1088 (T A Barton).
[4] See section 258 and 265 of the PPRA.

15. All the considerations necessary for authorisation of a controlled operation are left to be reflected upon by the chief executive officer of the agency, rather than a judicial officer (s 239). However, pursuant to section 244, an authority to conduct a controlled operation may not be granted unless the chief executive officer is satisfied of, "on reasonable grounds", a number of listed matters.

16. The High Court, in *Gedeon v Commissioner of the New South Wales Crime Commission*[5] held that the granting of an authority will be beyond the power of the relevant officer (in that instance, the Chief Commissioner of the New South Wales Crime Commission), if a "reasonable person" would not have found a criterion, or matter, fulfilled. Though that case concerned the *Law Enforcement (Controlled Operations) Act* 1997 (NSW), it is noteworthy that controlled operations legislation is largely mirrored in other States and at the federal level.

17. Relevantly, section 230(6) provides for the admissibility of evidence obtained as a result of a controlled operation. The section states that, "In deciding whether evidence should be admitted or excluded in any proceeding…" implying that a Court still retains discretion in admitting said evidence. Nevertheless, section 230(6) still mandates that the Court must disregard the fact that the evidence was obtained as a result of a person engaging in criminal activity, if:

    - the person was a participant or corresponding participant acting in the course of an authorised operation; and

    - the criminal activity was "controlled conduct", or conduct for which the person is not criminally responsible by virtue of section 258(2).

18. The law enforcement officer is not criminally responsible for conduct that amounts to an offence if, inter alia, the conduct is authorised by the operation and the conduct does not involve the officer intentionally inducing a person to commit an offence.

19. Relevantly, as recognised in the Second Reading Speech, "Evidence obtained will not be inadmissible in a court merely due to the covert nature by which it was obtained. However, nothing in the legislation interferes with the discretion of a court to admit or exclude evidence on public interest grounds."[6]

20. There remains, therefore, judicial discretion to exclude evidence on the grounds of public policy, namely that the evidence was obtained improperly or illegally.

[5] (2008) 236 CLR 120.
[6] Queensland, *Parliamentary Debates*, Legislative Assembly, 17 May 2000, 1083 - 1088 (T A Barton).

Evidence Obtained as a Consequence of Controlled Operations

21. In Australia, evidence obtained by controlled operations is generally dealt with by reference to the public policy discretion to exclude evidence.[7]

22. In *Bunning v Cross* (1978) 141 CLR 54, the High Court held that the Court's responsibility went beyond:

> "…ensuring fairness to an accused but instead [involved] the weighing against each other of two competing requirements of public policy, thereby seeking to resolve the apparent conflict between the desirable goal of bringing to conviction the wrongdoer and the undesirable effect of curial approval, or even encouragement, being given to the unlawful conduct of those whose task is to enforce the law."[8]

23. As Stephen and Aickin JJ held:

> "It is not fair play that is called in question in such cases but rather society's right to insist that those who enforce the law themselves respect it, so that a citizen's precious right to immunity from arbitrary and unlawful intrusion into the daily affairs of private life may remain unimpaired."[9]

24. Controlled operations legislation essentially grant law enforcement officers a "licence to deviate".[10] These operations generally involve the deliberate facilitation of a crime, or in extreme cases, the inducement/encouragement thereof.

25. It is difficult, and perhaps as Heydon notes in *Cross on Evidence*, undesirable, [11] to seek to define with precision the borderline between what is acceptable and what is improper in relation to undercover online operations. Nevertheless, it may be important to raise some technical legal issues that arise when attempting to convict via deception.

26. The most common argument that arises in relation to the admissibility of evidence obtained through controlled operations is whether the actions of the police amounted to "entrapment".

27. *Ridgeway* conclusively settled the issue that the substantive defence of entrapment, which is available in other jurisdictions such as the United States, does not exist in Australia. Nevertheless, a trial judge still retains the discretion as to whether or not to exclude evidence that may have been obtained by virtue of an operation that closely resembles entrapment.

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[7] *Bunning v Cross* (1978) 141 CLR 54.
[8] At 74.
[9] At 75.
[10] Bronitt S, 'Entrapment, Human Rights and Criminal Justice: A Licence to Deviate?' (1999) 29(2) *Hong Kong Law Journal* 216.
[11] J D Heydon, *Cross On Evidence Service* (LexisNexis Australia, 2018) at [27,310].

28. In *Ridgeway*, Gaudron J assessed the varying aspects of entrapment, concluding that:

> "Entrapment is not a term of art; nor is it a term with any precise meaning."[12]

29. After *Ridgeway*, it seems that the coincidence of the act and the intent makes the person guilty in law, regardless as to whether they would have committed that act *but for* law enforcement intervention.[13]

30. It is therefore difficult to define the line at which investigation devolves into inducement. That is, when does a police officer stop passively investigating criminal activity, and start inciting the commission of an offence, in these circumstances? More importantly, when exactly is this activity described as "improper" for the purposes of admissibility of evidence?

31. It may be helpful to provide some relevant examples.

Section 218A: Using the Internet to Procure – A Specific Example

32. Section 218A of the *Criminal Code 1899* makes it an offence for an adult to use electronic communication with intent to procure a person who is either in fact under the age of 16, or who the adult believes is under the age of 16, to engage in a sexual act.

33. To prove this charge, the prosecution must establish, inter alia, that the defendant then believed that the person was under the age of 16.

34. Relevantly, the Benchbook notes:

> "It does not matter that the child is a fictitious person represented to the defendant to be a real person, provided the prosecution prove beyond reasonable doubt that the defendant believed that the person being communicated with was a real person under the age of 16."

35. As was noted by the Queensland Court of Appeal in *R v McGrath* [2005] QCA 464 at [32]:

> "The expressed purpose of s. 218A is to permit <u>proactive detection</u> of pedophiles (sic) who are using the internet to procure children to engage in sexual acts." (underlining added)

36. The routine practice of law enforcement nowadays is therefore to "proactively detect" those persons lurking online who may pose a threat to children. This was not always the case. Historically, police officers posing as children would engage in

[12] (1995) 184 CLR 19 at 70.
[13] See Brendon Murphy, 'Retrospective on Ridgeway: Governing principles of controlled operations' (2014) 38 *Criminal Law Journal* 38.

communications on an already infamous child pornography site, hoping to organise a meeting and target the offender.

37. For example, in *R v Priest* [2011] ACTSC 18 (11 February 2011), Mr. Priest, physically based in Canberra, existed online in a blog that solely discussed and shared child pornography. He began extensively communicating with "Brad", who was in fact Detective McLaughlin. "Brad" circulated his information on the blog before Mr. Priest initiated communication. The communication almost always involved sexual discussion. "Brad," who was based in the United States, then suggested to Mr. Priest that he had a friend who lived in Canberra and who was "like us". Mr. Priest then made plans to meet this new friend, "Jaimie" (who was, in fact, Agent Chin). After appearing at a mutually planned location, police arrested and charged Mr. Priest.

38. Mr. Priest argued, amongst other things, that the police acted as *agents provocateur*. That is, they facilitated and induced the crime.

39. A question for the Court was whether the police behaviour that led to the commission of the offence provided a basis for a stay of the prosecution as an abuse of process, or required the exclusion of evidence. The Court admitted the evidence, for a number of reasons.

40. This case, along with other factually similar cases,[14] has elucidated a number of principles that relate to whether police conduct has "devolved" from passive investigation into active inducement.

41. First, these kinds of offences are believed to be extremely common but are, by their very nature, difficult to detect and unlikely to be reported by victims. Ordinary evidence gathering is therefore an impossible route for law enforcement to take; controlled operations or activities should therefore be utilised.[15]

42. Secondly, it is accepted in a number of cases that there is no impropriety in offering an "invitation" broadly to potential offenders who may at the time be completely unknown to the police.[16] "Random compliance testing" is not necessarily considered improper.[17] Take, for example, the situation where police offer the sale of a prohibited drug or object to an unsuspecting person.[18] If we consider this in the context of Mr. Priest: "Brad" released his information on an infamous child pornography site, an blog already targeted by law enforcement: Prior suspicion existed. In contrast, in the most recent situation I discussed, police went "undercover" on a phone application used by the general public, waited for a person to 1) begin communicating and 2) continue to communicate despite having been told that the person they were communicating with was underage. *R v Priest* and like cases suggest that the lack of pre-existing suspicion in cases such as this is not fatal to the admissibility of evidence in a trial. However, the

[14] See *R v Stubbs* [2009] ACTSC 63 (26 May 2009); *R v McGrath* [2005] QCA 463.
[15] *R v Priest* at [57].
[16] *R v Priest* at [29].
[17] *Robinson v Woolworths* (2005) 64 NSWLR 612.
[18] *Robinson v Woolworths* (2005) 64 NSWLR 612.

Court in *R v Priest* did warn that invitations can be considered so "inappropriately random" that they run "…the risk of inducing a person to commit an offence that would not otherwise have occurred to him or her."[19]

43. Thirdly, and largely connected to my previous point, there is an issue as to whether the action by the police is actually the provision of an opportunity to commit crime. Though England takes a divergent view from Australia on this, the comments of Lord Nicholls of Birkenhead in *R v Looseley* [2001] UKHL 53 are apt:

> "The investigatory technique of providing an opportunity to commit a crime touches upon other sensitive areas. Of its nature this technique is intrusive, to a greater or lesser degree, depending on the facts. It should not be applied in a random fashion, and used for wholesale "virtue-testing", without good reason."

44. Fourthly, the unfairness to the offender generally is only of peripheral importance.[20]

45. Ultimately, the way in which Courts have assessed the "impropriety" of police action in these cases could be termed as permissive. Courts appear to, in balancing the competing requirements of public policy, favour admitting evidence obtained by virtue of these controlled operations. That is not to say that police action in these circumstances has no limit. In *Robinson v Woolworths* (2005) 158 A Crim R 546, the Court considered the meaning of "improper" in the context of section 138 of the *Evidence Act 1995* (NSW). Basten JA, with whom Barr J agreed said:

> "It follows that the identification of impropriety requires attention to the following propositions. First, it is necessary to identify what, in a particular context, may be viewed as "the minimum standards which a society such as ours should expect and require of those entrusted with powers of law enforcement." Second, the conduct in question must not merely blur or contravene those standards in some minor respect; it must be "quite inconsistent with" or "clearly inconsistent with" those standards. Third, the concepts of "harassment" and "manipulation" suggest some level of encouragement, persuasion or importunity in relation to the commission of an offence…"

46. A further question, perhaps for another time, is that the Court in *R v McGrath* [2005] QCA 463 noted that the fact that no real child was the recipient of the offender's communications was a consideration relevant to sentencing. Though in these circumstances, the offending would technically be a "victimless crime", the provision requires "belief" that the person was under the age of 16. Surely the moral culpability of the offender in question is most relevant to sentencing.

Conclusion

47. Whilst these controlled operations have long been considered a proper and necessary method of investigating crime, it must equally be accepted that these procedures pose

[19] *R v Priest* at [59].
[20] *Ridgeway; R v Priest.*

a risk of being abused by law enforcement who may be tempted to induce the commission of a crime.

48. Traditional methods of undercover operations are being replaced by more active engagement online by police officers. That is, rather than targeting those previously suspected of an offence, law enforcement is dangling "bait" into virtual worlds.

2) DNA Evidence – Evidence Used to Convict (Or Acquit)

1. Dieter Pfennig was convicted of the murder of Michael Black, aged 10 years, in January 1989.[21]

2. More than thirty years later, Pfennig has been convicted of the murder of Louise Bell, a 10 year old girl who disappeared from her bedroom in 1983 and was never seen again.[22]

3. This conviction was largely founded on DNA evidence extracted from Louise Bell's pyjama top – a top that had been deposited in the front yard of a neighbour some weeks after the disappearance by a person who was reasonably inferred to be her killer.[23]

4. The rapid advances in DNA analysis techniques led to a breakthrough during a review of this cold case.

5. It is important to remember that DNA identification can serve a "two-fold purpose"[24]: determining guilt, or innocence.

6. Everyone would be familiar with DNA – a genetic blueprint that is found in blood, hair follicles, skin and any fluid which contains nucleated cells. However, DNA profiling is an increasingly complex technology.

7. In the human genome (the whole of a person's DNA), there are approximately three billion "sites" called loci which contain "information". Two pieces of information called "alleles" are found at each locus. These "alleles" are contributed by the person's father and mother. In DNA profiling, scientists assess the size of the allele to discriminate between people.

8. By comparing the size of the allele, DNA analysts are able to determine whether the profiles match. If they do not match, one can be excluded as coming from the other. If they do match, it does not mean that both samples actually come from the same person. The true result is that one sample **cannot be excluded** as coming from the other.

[21] *Pfennig v The Queen* (1995) 182 CLR 461.
[22] *R v Pfennig (No 2)* [2016] SASC 171 (11 November 2016).
[23] *R v Pfennig (No 2)* [2016] SASC 171 (11 November 2016).
[24] *R v Frank Alan Button* [2001] QCA 133.

9. The comparison of these alleles is given a "weighting" using statistical analysis. The most familiar statistical principle used in Court is the likelihood ratio.[25]

10. The likelihood ratio is the statistical weighting of the DNA evidence given two hypotheses. The first proposition is that an individual is a contributor to a DNA profile (the prosecution hypothesis) and the second proposition is that the individual is not a contributor (the defence hypothesis). Essentially, the likelihood ratio is the probability of the evidence in accordance with the prosecution hypothesis over the probability of the evidence of the defence hypothesis.

11. Importantly, DNA results are not evidence of the fact that the relevantly charged accused is, in fact, the killer. DNA results must be considered as circumstantial evidence led for the purpose of proving that the DNA matches that of the accused.

12. It may be best to give an example.

13. In Pfennig's case, a number of "tape lifts", "vacuumings" and a piece of fluff were extracted from the pyjama top. At first, the Forensic Science Centre South Australia undertook multiple tests on the tape lift. In 2011, the Centre did not have the capacity to calculate a statistical weighting in relation to the DNA profiles due to the low amount of DNA material they were able to gather. As a result, the FSSA arranged for the remaining DNA extract from both the piece of fluff and the tape lift to be sent to the Netherlands Forensic Institute. The NFI are considered to be experts in the area of DNA comparison where there are small amounts of material. This technique is called "low copy number" analysis, a new technique at the time.

14. From the LCN analysis, the NFI was able to arrive at a range of likelihood ratios by assessing and comparing two propositions:

    (1) Pfennig and one other person contributed to the DNA;
    (2) The sample contained the DNA of two unknown people.

15. The likelihood ratio for the tape lift compared with the accused was a figure between 9.6 billion and 36.9 billion in support of the proposition that the accused and one other person contributed to the DNA on the tape lift, **as opposed to** the proposition that the tape lift contained the DNA of two unknown individuals.

16. Another example of phrasing the likelihood ratio is: "It is about 10 billion times more likely the suspect left the sample than if a random person left the sample."[26]

[25] *Latcha v The Queen* (1998) 104 A Crim R 390; *R v GK* (2001) 53 NSWLR 317.
[26] *R v Karger* (2001) 83 SASR 133, at 140.

17. A standard report for DNA profiling may be termed along these lines:

> "The final statistical calculation does not prove uniqueness, but provides strong support for the hypothesis (without taking other evidence into account) that the DNA from the evidence sample originates from the matched individuals."

18. The likelihood ratio is not the only statistical principle that is used by DNA analysts. There is the "random match probability", which is essentially the estimated frequency at which a particular profile is expected to occur in the population. It is the theoretical chance that if one person is sampled at random from the population, they will match the relevant DNA profile. There is also the "exclusion percentage" – the proportion of the population who do not share the DNA profile with the accused.

19. These various statistical principles arose in *R v Aytugrul* [2009] NSWSC 275. Yusuf Aytugrul was convicted of murder on circumstantial evidence that included the results of a mitochondrial DNA test of a hair found on the victim's thumbnail. The expert witnesses reported that the DNA of the accused matched the hair follicle.

20. In particular, the expert witnesses discussed the prevalence of the DNA profile in the general population – the latter statement was expressed both as a "frequency ratio" of one in 1,600 (the average pool of people in which one would share the same profile) and also in terms of an "exclusion percentage" of 99.9 per cent (the proportion of the population who do not share the DNA profile).

21. The decision was appealed on the basis that the "DNA evidence being expressed as exclusion percentages should be rejected" as being "unfairly prejudicial". The appeal was dismissed. However, the case raises important questions – what is the probative value of stating the exclusion percentage, in addition to the frequency ratio? Moreover, is there a probabilistic formulation more appropriate for use in a criminal trial?

22. Aytugrul argued there was minimal probative value in articulating the evidence as an exclusion percentage. It was argued that, once the frequency ratio was known, any additional meaning attributable to the exclusion percentage was the subliminal rounding up of 99.9 per cent to 100 per cent.

23. According to the High Court in *Aytugrul v the Queen* (2012) 247 CLR 170, "there was no risk of rounding the figure of 99.9 per cent to the certainty of 100 per cent"[27] because "both the frequency ratio and the manner in which the exclusion percentage had been derived…were…explained in evidence to the jury", apparently eliminating any unfair prejudice that may have arisen.[28]

24. But not all DNA evidence is pure and unadulterated. For example, in the case of a low amount of DNA material, there may be complications attending the evidence that

[27] At [24].
[28] At [30].

preclude an expert from giving an opinion as to the weighting of that evidence. In *R v Juric*,[29] the Victorian Court of Appeal noted that:

> "…there are cases where the simplicity with which the [expert] opinion is expressed cannot be permitted to obscure the difficulties which have been encountered in the testing process. As in this case, those difficulties will include the poverty of the sample, its mixture with the bodily fluids of others, the age of the sample, the effect of the re- amplification process or the reliability of results and whether – because of or in spite of the encountering of these difficulties – any statistical probability can be pronounced as to the likelihood of other members of the community producing the same match."

25. It is with this amount of caution a Court should approach DNA evidence – the mere "stamp" of a likelihood ratio running into the billions may be enough to lead a juror into the prosecutor's fallacy. That is, it may be possible for the juror to draw the following conclusion:

    (1) Only person in a million (or billion) will have a DNA profile which matches that of the crime sample;
    (2) The accused has a DNA profile which matches the crime sample;
    (3) There is therefore a million (or billion) to one probability that the defendant left the crime sample and is guilty of the crime.

26. This fallacy involves the flawed thought process that would treat the expert's statistical evidence as ***proof of guilt***, rather than as evidence from which a conclusion on a matter which might in turn point to guilt could be reached.

27. This is a dangerous and incorrect conclusion. Understanding how DNA evidence contributes to the fabric of an entire case may assist in avoiding (perhaps, accidentally) leading a juror into flawed thinking.

28. DNA evidence must be considered as only one part of the overall evidence in a case. [30] This is an essential point to make. The statistical evidence is, undeniably, strong evidence pointing to a conclusion that the accused was a source of the incriminating DNA, but it is not direct evidence of that fact.[31] The statistical evidence must be considered in the light of other evidence.

29. The first and most important step for the prosecution is to exclude the possibility of laboratory error beyond reasonable doubt. If the jury are satisfied of this then regard can be had to the likelihood ratio.[32]

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[29] Unreported, Supreme Court of Victoria, Court of Appeal, per Winneke P, Charles and Chernov JJA (29 May 2002) at [20].
[30] *The Queen v Hillier* [2007] HCA 13.
[31] *R v Karger* (2001) 83 SASR 133, at 140.
[32] *R v Doheny and Adams* [1997] 1 Cr App R.

30. To do this, the Crown should serve on the defence details of the calculations carried out.[33] As was noted in *R v Doheny & Adams* [1997] 1 Cr App R 369:

> "The cogency of DNA makes it particularly important that the DNA testing is rigorously conducted so as to obviate the risk of error in the laboratory. The method of DNA analysis and the basis of subsequent statistical calculation should – so far as possible – be transparent to the defence. The true import of the resultant conclusion [should be] accurately and fairly explained to the defence."

31. The consequences of laboratory error are profound. In *R v Jama*,[34] Farah Jama was convicted of raping a woman in a nightclub in 2006. Jama was found guilty of rape solely on the basis of DNA evidence. Jama was incarcerated for 16 months before a solicitor doing pro-bono work asked the Office of Public Prosecutions to re-test the DNA sample. The doctor who had examined the alleged victim had taken swabs from another woman 28 hours earlier, who had in fact engaged in sexual activity with the accused. The Court later found that the DNA sample had been contaminated, and it was likely that no rape had occurred.

32. Frank Vincent QC was tasked to lead an inquiry into the circumstances that led to the conviction of Jama. In quite powerful terms, he wrote:

> "The DNA evidence was, like Ozymandias' broken statute in the poem by Shelley, found isolated in a vast desert. And like the inscription on the statue's pedestal, everything around it belied the truth of its assertion. The statue, of course, would be seen by any reasonably perceptive observer, and viewed in its surroundings, as a shattered monument to an arrogance that now mocked itself. By contrast, the DNA evidence appears to have been viewed as possessing an almost mystical infallibility that enabled its surroundings to be disregarded. The outcome was, in the circumstances, patently absurd."[35]

33. More recently, *Staines v West* [2017] WASC 330 concerned an appeal against conviction. In 2005, the appellant had pled guilty to a charge of burglary. The prosecution relied on a sample of blood found at the scene of the burglary. Testing of the blood for DNA resulted in a match with the appellant. However, there was an error at the testing facility. The match was not to the appellant, but simply to another person with the same first and last name.

[33] *R v Doheny and Adams* [1997] 1 Cr App R.
[34] Unreported, Supreme Court of Victoria, Court of Appeal, 2009.
[35] Vincent FRH, the Hon QC, *Report – Inquiry into the Circumstances that led to the Convcition of Mr Farah Abudlkadir Jama* (May 2010) (Vincent Report), at 10.

34. The error wasn't discovered for many years. The testing facility advised the police in 2016. The police then advised the appellant in 2017. The only evidence that could identify the appellant as the person who committed the burglary was the DNA evidence. Hall J held:

> "Not every case involving an error in the DNA evidence will necessarily result in a conclusion that there has been a miscarriage of justice. In any particular case the outcome will depend upon the significance of the DNA evidence, whether there was other evidence implicating the accused and the effect that the erroneous evidence had upon the decision of the appellant to plead guilty.
>
> In this case, it is clear that the guilty plea was entered because of the erroneous DNA evidence. In any event it is now apparent that without the DNA evidence there was no evidence upon which the appellant could be lawfully convicted. I am satisfied that a miscarriage of justice has been established."

35. An even more perplexing case in Europe illustrates both the cogency and high mobility of DNA. For more than 15 years, detectives across Europe sought to bring to justice "The Woman Without a Face" – a person whose DNA had been found at 40 different crime scenes, and was suspected to be a serial killer. DNA traces had been collected on cotton swabs, supplied to the police in a number of countries. It now appears likely that the DNA was not left by the supposed serial killer, but by a woman working for the medical company supplying the swabs, having contaminated them. A police spokesperson simply admitted: "This is a very embarrassing story."[36]

36. DNA evidence, like all evidence, must be properly proved. It is liable to be tested by the usual forensic means, including cross-examination or contrary expert evidence. The expert's conclusions are amenable to devaluation by exposing defects in the laboratory process, for example.[37]

37. The evidence must be evaluated in context. Evidence that contradicts the DNA profiling match is not solely scientific or expert evidence: the accused may have an alibi; there may be an innocent explanation as to the presence of the DNA; or there may simply be no way to confirm that the accused was present at the scene of the crime.

38. At no point should an expert giving evidence as to DNA profiling be asked to give his or her opinion on the likelihood that it was the defendant who left the crime stain. It is a statement based on statistics, not certainty. The only inference the jury can draw from a DNA profile match is that the accused cannot be excluded.

39. That the jury should be directed that this is the only inference to be made is all the more important when secondary transfer is considered. DNA is highly mobile, meaning that

[36] Tony Paterson, 'DNA blunder creates phantom serial killer', *The Independent* (online), 27 March 2009, https://www.independent.co.uk/news/world/europe/dna-blunder-creates-phantom-serial-killer-1655375.html.
[37] *Farnell v Penhalluriack (No 2)* [2008] VSC 214.

it can be carried by others and transferred to objects, which may then act as intermediaries between the potential accused and victim.

40. *Fitzgerald v The Queen* [2014] HCA 28 concerned an appeal against conviction. The prosecution relied on DNA evidence obtained from a sample taken from a didgeridoo found at the crime scene to establish that the appellant was part of a group that entered a dwelling and attacked two of the occupants. One victim died, and another sustained serious brain injuries.

41. The prosecution's case was that the presence of the appellant's DNA on the didgeridoo, together with apparent blood stains containing the DNA of the deceased and the other victim, sufficed to prove the appellant's presence at the scene. The case depended upon proving, beyond reasonable doubt, that the appellant's DNA was transferred by him to the digeridoo at the time of the attack.

42. As part of the case, a forensic expert gave evidence as to the distinction between primary and secondary transfer. A primary transfer occurs as a result of direct contact between a particular person and an object. A secondary transfer occurs when contact or trace DNA is transferred onto an object by an intermediary – for example, touching a door handle or through a handshake.

43. The appellant argued, inter alia, that a secondary transfer of the appellant's DNA to the didgeridoo occurred. The appellant's co-accused, Sumner, had visited the dwelling previously. Sumner had been involved in several physical altercations at the house. There was evidence that before his first visit to the dwelling, he had attended a boxing match where he had shaken hands twice with the appellant. There was no challenge to the evidence that there were two distinct occasions where a secondary transfer could have occurred. The prosecution, the High Court held, simply did not prove beyond reasonable doubt that the appellant was present at, and participated in, the attack. Importantly, alternative hypotheses consistent with the appellant's innocence could not be excluded.

44. Secondary transfer was also argued by *Pfennig* in the trial.[38] He argued that:

    (1) The accused may have come into contact with the deceased whilst the accused was either picking up his daughter Petra, or whilst present at basketball games;
    (2) Petra, being in the same basketball team and at the same school, had contact with the deceased since they trained once a week and played games once a week.

45. The trial judge found it "inconceivable" that the DNA extracted by the tape lift could have been fortuitously transferred from the accused, to his daughter Petra, then to the deceased, and then further on to the pyjama top. At the trial, there was no evidence that

[38] *R v Pfennig (No 2)* [2016] SASC 171 (11 November 2016).

Petra ever came into contact with Louise at sleepovers, or in circumstances where she would have been wearing the pyjama top.

46. Pfennig then sought leave to appeal the conviction.[39] He argued that there was no evidence adduced by the prosecution capable of excluding as a reasonable possibility the innocent transfer of the applicant's DNA to Louise Bell's pyjama top.

47. The prosecution argued that the possibility that there was a sequence of transfers beginning with Pfennig's DNA and ending with the pyjama top with the DNA subsisting at each stage was so remote as to be fanciful. In the application, Justice Blue referred to *Fitzgerald.*[40]Justice Blue distinguished the facts of *Fitzgerald* and *Pfennig*: in the former, there was no other evidence linking Fitzgerald to the crimes. In the latter, there were multiple items of circumstantial evidence. However, despite this distinction, Justice Blue held that the question of whether Pfennig's conviction was unreasonable having regard to the evidence by reference to the possibility of secondary transfer was not a question that could be determined by a single Judge. His Honour therefore granted permission to appeal to the Court of Criminal Appeal.

48. On 1 May 2018, Pfennig lost this appeal. The South Australian Court of Criminal Appeal held that all the evidence against Pfennig "established a cogent basis for the judge's verdict" and excluded any "innocent hypothesis" for the presence of his DNA on the top. Pfennig's non-parole period was extended to 60 years, when Pfennig will be 103.

49. Relevantly, when dealing with DNA evidence in a criminal trial, regard should be had to the following considerations:

    - A DNA profile match is not evidence that both samples actually come from the same person, and that the accused is therefore guilty;
    - A DNA result is just one piece in a circumstantial puzzle, and should be supported by other items of evidence;
    - The prosecution must exclude the possibility of laboratory error beyond reasonable doubt;
    - There may be doubt as to whether there is a probabilistic formulation that is most appropriate for use in a criminal trial;
    - DNA evidence must be properly proved;
    - The possibility of secondary transference should be excluded beyond reasonable doubt.

50. Most importantly, DNA evidence is not infallible. It is highly fragile, mobile and subject to transference, contamination and other processing errors.

[39] *R v Pfennig* [2017] SASCFC 26.
[40] *R v Pfennig* [2017] SASCFC 26, at [129] and [130].

51. The rapid development of technology used to convict persons demands that we assess the capacity of existing systems to ensure the effective and consistent application of the rule of law.

3) Artificial Intelligence and Sentencing

Introduction

1. An international commentator, Michael Tonry, has noted that, in sentencing, we must confront the "antipodean twins" of discretion and disparity.[41]

2. The giant of jurisprudence, Ronald Dworkin, gave life to the metaphor of Judge Hercules, an ideal judge, immensely wise and possessing complete knowledge of all legal sources. Judge Hercules, Dworkin argues, was always capable of reaching the "one right answer".

3. What if "Judge Hercules" was actually the artificially intelligent computer program, capable of sifting through masses of data to find the most appropriate decision?

4. In a world that is thoroughly permeated by technology, it is perhaps useful to question how these digital advancements may be reconciled with more traditional notions of legal work.

5. Computers already collate enormous amounts of primary and secondary legal resources. Algorithms have been created to undertake "e-discovery". Variations of artificial intelligence are used for social security and taxation decisions. Thus, proponents of automated decision-making argue that artificial intelligence is already being used in ways that can have a profound impact on important individual rights and interests.

6. The next step for these proponents is to transfer the use of artificial intelligence and automated decision-making to the law. More precisely, to sentencing.

7. Proponents argue: 1. Sentencing involves the analysis of general principles, in addition to a multitude of mitigating and aggravating factors. 2. Artificial intelligence itself involves reaching a decision through the calibration of multiple variables. 3. Sentencing is therefore amenable to automated decision-making.[42]

[41] Michael Tonry, 'Sentencing Reform Across National Boundaries' in C Clarkson and R Morgan (eds), *The Politics of Sentencing Reform*, (Clarendon Press, 1995).
[42] Dr Nigel Stobbs, Dan Hunter and Mirko Bagaric, 'Can Sentencing Be Enhanced by the Use of Artificial Intelligence?' (2017) 41 *Criminal Law Journal* 261.

Sentencing Principles: Briefly

8. When arriving at a sentencing decision, there are a multitude of mitigating and aggravating factors.[43]

9. Common mitigating factors may include an offender pleading guilty,[44] previous good character,[45] and mental illness.[46]

10. Common aggravating factors include poor criminal record,[47] offences committed while on bail,[48] and breach of trust.[49]

11. Judicial discretion is at the heart of sentencing. For example, in *R v Melano; Ex parte Attorney-General* [1995] 2 Qd R 186, the Court referred to Mason J's comment in *Lowe v The Queen* (1984) 606 at 612:

> "As the ascertainment and imposition of an appropriate sentence involves the exercise of judicial discretion based on an assessment of various factors, it is not possible to say that a sentence of a particular duration is the only correct or appropriate penalty to the exclusion of any other penalty."

12. Further, in *Elias v The Queen* (2013) 248 CLR 483 at 494, French CJ, Hayne, Kiefel, Bell and Keane JJ noted:

> "As this Court has explained on more than one occasion, the factors bearing on the determination of sentence will frequently pull in different directions. It is the duty of the judge to balance often incommensurable factors and to arrive at a sentence that is just in all of the circumstances."

13. If one were to use labels, the reasoning process employed in relation to sentencing has been referred to as "instinctive synthesis".[50]

14. This process was described by French CJ, Gummow, Hayne, Heydon, Crennan, Kiefel and Bell JJ in *Muldrock v The Queen* (2011) 244 CLR 120 at 131 in the following way:

> "The judge identifies all the factors that are relevant to the sentence, discusses their significance and then makes a value judgment as to what is the appropriate sentence given all the factors of the case."

15. This process has the consequence that Judges are not required to, nor permitted to, set out with particularity the weight given to those relevant considerations. A decision may

[43] J Shapland, *Between Conviction and Sentence: The Process of Mitigation* (Routledge & Kegan Pal, 1981).
[44] *Cameron v The Queen* (2002) 209 CLR 339.
[45] *Ryan v The Queen* (2001) 206 CLR 267.
[46] *Muldrock v The Queen* (2011) 244 CLR 120.
[47] *R v Field* [2011] NSWSCCA 13.
[48] *R v Gray* [1977] VR 225.
[49] *DPP v Truong* [2004] VSCA 172.
[50] Originating from *R v Williscroft* [1975] VR 292, at 300.

not necessarily demarcate with precision the weight given to each factor, and how that has influenced the sentence.

16. As such, there is therefore no single "correct" sentence.[51] Recently, in *Director of Public Prosecutions (Vic) v Dalgliesh (Pseudonym)* [2017] HCA 41, Kiefel CJ, Bell and Keane JJ held at [65]:

> "The process of instinctive synthesis thus allows a measure of discretion to the sentencing judge. The discretionary nature of the judgment required means that there is no single sentence that is just in all the circumstances."

17. Importantly, the Courts recognise that reasonable minds will differ as to the sentence given.[52] Furthermore, such an approach allows for, and in fact encourages, individualised justice.[53]

18. However, some argue that this approach provides a lack of transparency for the community, and can lead to unpredictability and inconsistency:[54]

> "In the absence of clear explanations for how and why any particular circumstances of mitigation or aggravation impact on the final sentence imposed, the potential for arbitrary punishment exists."[55]

19. The instinctive synthesis approach does not purport to steer away from consistency. Judicial discretion is not unfettered. There remain general principles, and fundamental factors, that are consistently taken into account when arriving at a sentencing decision.

20. In *Hili v The Queen* (2010) 242 CLR 520, French CJ, Gummow, Hayne, Crennan and Kiefel JJ referred to this seemingly amorphous term, "consistency":

> "These reasons will show that the consistency that is sought is consistency in the application of the relevant legal principles, not some numerical or mathematical equivalence.
>
> Consistency is not demonstrated by, and does not require, numerical equivalence. Presentation of the sentences that have been passed on federal offenders in numerical tables, bar charts or graphs is not useful to a sentencing judge. It is not useful because referring only to the lengths of sentences passed says nothing about why sentences were fixed as they were…The consistency that is sought is consistency in the application of relevant legal principles."

Artificial Intelligence – How would it work?

[51] *Markarian v The Queen* (2005) 228 CLR 357.
[52] *Hudson v The Queen* (2010) 30 VR 610.
[53] *Elias v The Queen* (2013) 248 CLR 483 at [27].
[54] Dr Nigel Stobbs, Dan Hunter and Mirko Bagaric, above n 42, 266.
[55] Ibid.

21. Those who see sentencing as being amenable to the use of artificial intelligence suggest that research would be conducted into a large number of previous decisions in the relevant jurisdiction. This would create what would a "database" that could be used to "input" relevant data, and produce an "outcome".

22. There are two major flaws with the notion that sentencing is easily amenable to the use of artificial intelligence.

23. First, this "database" both produces, and is based upon, a statistical analysis of previous sentencing decisions. The proponents argue:

> "Another incidental benefit of an algorithm for sentencing is that it would reduce subconscious bias in decision-making. In contrast to humans, computers have no instinctive or subconscious bias, are incapable of inadvertent discrimination and are uninfluenced by extraneous considerations or by assumptions and generalisations ***that are not embedded in their programs***." (emphasis added)

24. I emphasise the latter part of this sentence for a very important reason. For computerised sentencing to be unbiased, it cannot incorporate the "bias" that apparently permeates the current sentencing regime. The database produced by the algorithm, if it is to be of any use at all, must derive its information from **previous** sentencing decisions. It is difficult to understand how such an algorithm does not incorporate the "subconscious" bias, assumptions and extraneous considerations in those past decisions.

25. It is doubtful, albeit from a superficial glance, how such an algorithm could work. Would it really be able to exclude or negate existing distortions in the system? It would seem, in fact, that an algorithm could actually perpetuate anomalies in our legal system.

26. Secondly, for the database to "do the Judge's job", it would need to identify the weight given by the relevant sentencing judge to each factor or variable. An effective sentencing database cannot function on listing the relevant factors alone. Each variable, whether it be the damage caused by the offender, the culpability of the offender, or the nature of the offence itself, does not exist in a vacuum. Each are interrelated forces that push and pull in many different directions.

27. As we mentioned earlier, sentencing requires judicial discretion for individualised justice to be achieved.

28. In *R v Shrestha* (1991) 173 CLR 48, the High Court held at 60-61:

> "It is one thing to identify sentencing principles which must govern the imposition of a sentence…It is another thing to attempt an artificial division of the indivisible process of determining the appropriate sentence to be imposed."

29. Proponents further argue that a more appropriate use of artificial intelligence in sentencing may provide ***structure*** **not** ***restriction*** to judicial discretion.

30. In this way, artificially intelligent sentencing algorithms may be akin to "guideline judgments".

31. In *R v Jurisic* (1998) 45 NSWLR 209, the NSW Court of Criminal Appeal gave what it called a guideline judgment. Spigelman CJ held at 17:

> "The existence of multiple objectives in sentencing – rehabilitation, denunciation and deterrence – permits individual judges to reflect quite different penal philosophies. … Indeed, judges reflect the wide range of differing views on such matters that exists in the community. However, there are limits to the permissible range of variation. The courts must show that they are responsive to public criticism of the outcome of sentencing processes. Guideline judgments are a mechanism for structuring discretion, rather than restricting discretion."

32. Queensland only inserted provisions relating to guideline provisions into the *Penalties and Sentencing Act* 1992 (Qld) in 2010. Part 2A of the legislation authorises the Court of Appeal to give guideline judgments.

33. Guideline judgments are to be given to "guide the future exercise of discretion" and "articulate principles to underpin the determination of a particular sentence".[56] Similarly, guideline judgments do not purport to "establish a rule of binding effect", nor "state the expected decisions in a future proceeding".[57]

34. Guideline judgments are given to promote "consistency of approach in sentencing"[58]and to "promote public confidence in the criminal justice system".[59]

35. Artificially intelligence sentencing and guideline judgments may, therefore, have more in common than once thought. Perhaps the former is the "new age" guideline judgment.

36. To find some middle ground between those who contend that artificial intelligence can "take over" sentencing, and those who argue that it is impossible – ideally, Courts could generate the computer sentence as a reference point before finalising the ultimate sentence: Much like referring to a guideline judgment. Human agency in sentencing would therefore be maintained, with the addition of a new age pre-sentence investigation report.

[56] *Penalties and Sentencing Act* 1992 (Qld) s 15AC (2).
[57] *Penalties and Sentencing Act* 1992 (Qld) s 15AC (2).
[58] *Penalties and Sentencing Act* 1992 (Qld) s 15AH (a).
[59] *Penalties and Sentencing Act* 1992 (Qld) s 15AH (b).

Another option?

37. There are suggestions that there may be an alternative to a situation where artificial intelligence takes over sentencing altogether.

38. Currently, algorithmic risk-assessment tools are being used in the United States to measure an offender's chances of endangering public safety by reoffending. Perhaps automated prediction should play a role in determining the likelihood of recidivism.

39. In the United States, an analytics tool called 'Correctional Offender Management Profiling for Alternative Sanctions' (COMPAS) has been used in relation to determining the likelihood of recidivism.

40. COMPAS essentially determines whether an offender is likely to reoffend by reference to the behaviour of past offenders in similar circumstances. COMPAS will take information provided by the defendant and compare it with other data to build predictive models. Risk scores predict the general likelihood that those with a similar history of offending are more or less likely to commit another crime following release from custody. COMPAS provides a prediction based on a comparison to a similar data group.

41. Most recently, the Wisconsin Supreme Court dealt with the use of COMPAS in determining an offender's likelihood of reoffending.[60] The particular offender argued that COMPAS violated his right to an individualised sentence. A significant problem with this process is that the company which owns COMPAS will not reveal the structure of its algorithms and, so, a defendant cannot challenge the means by which the conclusion was reached. This is entirely inconsistent with the common law requirement that a decision maker must expose his or her reasoning.

42. The case gives rise to whether these risk assessment algorithms should be used in sentence decision-making. A number of points should be raised here for us to consider.

    - Algorithmic tools should not be the sole basis for the decision;
    - Such tools should not be used to determine the severity of the sentence;
    - The specific algorithm used by the tool is not generally disclosed by its creators – therefore, it is unclear exactly how risk scores are determined, or how relevant sentencing considerations are weighed;
    - It should be recognised that these algorithms may disproportionately classify minority offenders as having a higher risk of recidivism; that is, advances in technology may actually reinforce existing inequalities;
    - We must be aware that individuals tend to weigh purportedly "expert" or "empirical" evidence more heavily than other evidence;
    - If Judges do use these analytical tools, they should explain the factors (other than the tool itself) that support the sentence imposed.

[60] *Wisconsin v Loomis* 2016 WI 68.