

Cognitive Bias and Its Impact on Expert Witnesses and the Court

By Itiel E. Dror, Justice Bridget M. McCormack, and Jules Epstein

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Expert evidence provides a much needed contribution to the courts in administering justice. Understanding the way humans think and how the brain processes information offers insights to circumstances in which even expert evidence may be influenced by contextual information and cognitive bias. Cognitive science can identify such potential weaknesses and suggest practical ways to mitigate them.

Courts rely on expert witnesses and mostly assume that they provide impartial and objective evidence. Yet cognitive science shows that even the most dedicated and committed experts are influenced, without even realizing it, by factors unrelated to the data relevant to form their expert conclusion. For example, it has been demonstrated that experts' conclusions on whether crime scene evidence was left by a specific person were influenced by whether they were told that the suspect confessed or, alternatively, that the suspect could not have committed the crime because of a rock-solid alibi. Because juries and judges often depend on reports and testimony from experts it is important to understand the limits and potential vulnerabilities of those witnesses. At the same time it is critical to find ways to increase and improve the contribution experts make to the fact-finding process.

This article will review and summarize the relevant science, discuss how other nations have responded to this problem, and address how the issue of cognitive bias might be confronted in criminal proceedings in this country.

Human Cognition and Expertise

Our brains have limited capacity but they are nevertheless very effective and efficient. This is because they are not passive but instead actively use context and expectation to determine which information to process and how to process it. The human mind is not a camera but rather selects 'parts of a picture' to focus on. Complex cognitive mechanisms are involved in the way in which humans perceive and interpret information, make judgments and reach decisions.

These cognitive mechanisms stand at the heart of intelligence and expertise. Paradoxically, as people become experts their brains change and develop very useful capacities, but these very mechanisms can also increase the susceptibility to bias. For example, the cognitive underpinning of expertise entails filtering information, generating ideas and expectations, focusing on certain elements, and using past experience to guide attention and interpretation. Filtering and other cognitive processes allow experts to possess superior abilities, but sometimes at a cost of missing

and ignoring important information, fixation and escalation of commitment, and bias¹. These cognitive trade-offs are characteristic of experts across domains, be it medical professionals, forensic examiners, military fighter pilots or police officers.

Cognitive science research demonstrates that judgments are shaped by a broad range of factors. For example, expectation or hope can cause tunnel vision by directing attention selectively towards certain information while ignoring other important facts². Similarly, context, motivation and emotions can distort perception and judgments³. And starting with an idea or hypothesis can cause experts to fixate and escalate cognitive commitment so much so that they do not objectively and properly consider other alternatives or identify mistakes⁴.

People, for example, judge facial similarity between two individuals as higher when they are made to think that the two are genetically related⁵, or higher similarity between a facial composite and a suspect when they believe the suspect is guilty⁶. In other words, a mere expectation can bias the cognitive and brain mechanisms involved in perception and judgment.

It is very important to note that cognitive biases work without awareness, so biased experts may think and be incorrectly convinced that they are objective, and be unjustifiably confident in their conclusion⁷.

Experts in the Court Room

Experts provide important and valuable contributions to the criminal justice system. Their testimony carries significant weight because they generally appear (and present themselves) as objective, impartial, and scientific. The justice system, however, must make sure that courts are provided with the very best scientific and expert evidence, and that it is correctly understood and utilized by the factfinders.

One set of concerns relates to experts who may overstate the evidence⁸. This can occur for two main reasons: First, experts may be over confident and overestimate their own abilities. This results from meta-cognition: The ability to ‘know what you know and know what you do not know’ – which is an area that humans are not especially good at. Second, although experts share an understanding that it is their duty to be independent and uninfluenced by the exigencies of litigation, and to be objective and unbiased⁹, experts are most often recruited by one side of the adversarial system, and work within the team and objectives of that side¹⁰. This places many experts in a non-neutral environment and posture, and can subconsciously influence their perception and judgments¹¹.

Another set of concerns is that in most domains expert evidence is simply not purely objective and scientific. For example, the domain may not have sufficiently detailed methodologies and objective quantification instrumentation¹². Therefore most “expert” evidence relies on interpretation and judgment, and includes subjective elements¹³. Take, for example, forensic science. Most forensic disciplines require human examiners to compare two patterns: one from the crime scene and one from a suspect. These may be shoe or tire marks, fingerprints, a CCTV image, handwriting, or marks on fired cartridge cases. Since the pattern from the crime scene and that from the suspect are never identical (even when they are from the same source), it is the

human examiner who needs to determine if they are ‘sufficiently similar’ to conclude that they come from the same source. Subjectivity is required because there are no objective criteria that specify what constitutes ‘sufficient similarity’. It is left to the human examiner—the main ‘instrument of analysis’—to judge the similarity and to subjectively determine whether the evidence is ‘sufficiently similar’¹⁴.

Fingerprinting—powerful expert evidence—has been shown to be susceptible to bias. For example, research has demonstrated that when the same evidence is presented to the same examiner, but within different extraneous contexts, the examiner may reach different conclusions. Information irrelevant to the science of fingerprinting (such as whether the suspect confessed to the crime, what the detective thinks, etc.) can influence the way fingerprint examiners perceive the similarity between the prints and the conclusions they reach¹⁵.

Similar findings have been found in other forensic domains, such as in DNA mixture interpretation¹⁶. The Court of Appeal in England and Wales has recently determined that there is no objective standard in determining ‘excluded’ or ‘cannot be excluded’ from a DNA mixture, and that as a result “[a]n evaluative opinion would necessarily in such cases be subjective”¹⁷. With subjectivity the potential impact of extraneous influences is greater. As the Court of Appeal states, however, “that does not mean that it should not be admitted provided that there is a reliable scientific basis for it”¹⁸. As long as subjectivity is involved, admitting the evidence with full information to the factfinder regarding the subjectivity and its vulnerability to cognitive bias could be the best way forward.

If such issues arise with DNA experts, we can be quite confident that they apply equally (if not more) to other less established or less scientific forensic domains¹⁹. Indeed, the United Kingdom Forensic Regulator recently concluded that: “cognitive bias (also referred to as contextual bias, or observer effects) is an issue that is relevant to forensic science”²⁰, and similar findings were reached by the US National Institute of Standards and Technology (NIST)²¹.

These issues are relevant to many other domains in which the court relies on experts, such as medical expert evidence on shaken baby syndrome. Any expert or scientific domain that requires interpretation, or in which the human examiner is the instrument of analysis (or part of it), is subject to contextual influences that may effect and bias perception and decision making.

Cross Contamination: The Bias Snowball Effect

The potential problems with expert testimony are not limited to psychological contamination of a specific piece of evidence. Although some types of evidence are often presented in court as independent, most often this claim is overstated. Each affects (and potentially contaminates) one another. Hence, expert testimony about one type of evidence is not independent of other (unrelated and different) types of evidence. For example, a forensic examiner may be exposed to other forensic evidence in the case or what the investigating detective thinks²², or a suspect confessing to a crime may be aware of evidence placing the suspect at the crime scene²³.

If those influences are not explicitly reported, then the factfinder is inadvertently misled. For example if the fingerprint examiner knew that the suspect was also identified by DNA evidence

and that affected the conclusion that the fingerprints found at the crime scene matched those of the suspect, when presenting the conclusions that the fingerprints match the examiner (mis)presents the conclusion as if it was solely based on the fingerprints evidence. This is misleading and misrepresents what the conclusions are really based on. Furthermore, by using the DNA evidence (in this example, but it can be a variety of other effects, such as being influenced by a suspect's confession), this evidence is double counted: first —implicitly— as part of the fingerprint evidence, and then again when the DNA expert testifies.

Such cross-evidence influences and how they may contaminate each other deserve attention. It is up to the factfinder to weigh the value of each type of evidence and to integrate unrelated lines of evidence, whereas the experts should examine the relevant evidence in isolation, without the potentially biasing influences of other irrelevant evidence or opinions. When such cognitive contamination occurs between different —and supposedly independent— types of evidence, a 'bias snowball effect' may take place, whereby the biasing influences grow in strength as more evidence is exposed to the bias and in turn exposes others to bias as well²⁴.

Cognitive Bias and the Law in the United States

What science has proved, the law has long intuited. Bias may be subconscious and affect perception and memory, and is relevant in assessing witness credibility. "Bias is a term used...to describe the relationship between a party and a witness which might lead the witness to slant, unconsciously or otherwise, his testimony in favor of or against a party."²⁵ The relationship between domain-irrelevant information and crime scene evidence runs exactly this risk: it "might lead the witness to slant, unconsciously or otherwise, his testimony in favor of or against a party..." This process is no different for expert witnesses than for lay witnesses.

Federal Rule of Evidence 702, which governs the admissibility of expert testimony, requires not only that the expert's methodology be reliable but that, in any particular case, "the expert has reliably applied the principles and methods to the facts of the case." This requirement can put questions of cognitive bias squarely at issue. Specifically, a claim that biasing information affected the forensic expert – either because there is demonstrable proof of the same or because the lab or analyst has no procedure in place to mitigate the risk – goes to the heart of this 702 concern.

Nonetheless, most courts tend to treat issues similar to cognitive bias as relevant to weight rather than the threshold question of admissibility. "[Q]uestions as to whether an expert has applied a particular methodology correctly typically go to the weight of the evidence..."²⁶ This reaction is not surprising given the frame courts typically use to assess the reliability of methodology. It has been historically common that courts are hesitant to make decisions precluding the introduction of the underlying evidence.²⁷

While courts have the authority to consider the methodology, flaws and all, when deciding whether to exclude testimony, the prevailing view is that "errors in application should result in the exclusion of evidence only if they render the expert's conclusions unreliable; otherwise, the jury should be allowed to consider whether the expert properly applied the methodology in determining the weight or credibility of the expert testimony."²⁸

This hesitation to exclude the testimony as a remedy for problematic methodology is also found in *Frye* jurisdictions, where the focus of the inquiry is intended to be limited to the general acceptance of the methodology. “[I]f an expert improperly uses a generally accepted methodology, any such errors go to the weight to be given to his testimony, not its admissibility, at least where the expert honestly followed the methodology as he understood it.”²⁹ In other words, unlike *Daubert*, the *Frye* test has arguably embedded the preference for weight relevance over admissibility relevance.

Factoring in the risk of cognitive bias is thus thought of as inherent to methodology. Given this background understanding, it will be the rare case where exclusion is a viable option under *Daubert* or *Frye*. The counter, therefore, is vigorous time-of-trial testing of the testimony. “Vigorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence.”³⁰ It is in this context that discovery and judicial protocol will have an important impact.

Full disclosure of information is a critical principle of science. In the context of a criminal prosecution that principle can have constitutional significance. Disclosure of issues relating to cognitive bias might be required by Due Process, and in particular by *Brady v Maryland*³¹ and its progeny.

Brady requires disclosure beyond just what is contained in the prosecutor’s files. The prosecutor “has a duty to learn of any favorable evidence known to others acting on the government’s behalf in the case, including the police.”³² And *Brady* evidence includes bias and interest, classic impeachment evidence. Cognitive bias failures or lapses plainly fit within this category.

Regardless of the *Brady* obligation, a court may also establish its own protocol for addressing cognitive bias concerns. And there is a model for doing so. In 2010, then Federal District Court Judge Nancy Gertner directed a specific protocol for “trace evidence” cases, requiring that the parties examine the evidence and determine whether a pre-trial admissibility hearing was needed. An analog protocol for addressing cognitive bias might direct any party seeking to admit forensic evidence to determine, and then disclose, whether the lab or practitioner has in place any process addressing cognitive bias and all information received by the examiner prior to conducting the testing and drawing conclusions. With the information provided ahead of a witness’ testimony the parties and the court can make a meaningful relevance determination.

That final step is where the action is. Once the information is disclosed to counsel, the court’s concern must be that evidence of cognitive bias and its potential or actual impact on the examiner and their resulting conclusion(s) is appropriately treated. As mentioned, this evidence will be relevant in evaluating the admissibility, or at least the weight that should be given to, the expert’s testimony. But apart from these questions of evidentiary admissibility and relevance with respect to the expert’s testimony, the Constitution may require admitting the evidence of cognitive bias.

The accused in a criminal case has the constitutional right to expose witness bias. This has been recognized as a core Sixth Amendment right since at least 1974 in *Davis v. Alaska*.³³ “Hidden sometimes subconscious bias is just this sort of information.”³⁴

Thus, showing bias or potential bias by cross-examination is critical. If a court is concerned with meaningful jury assessment of the risks of cognitive bias, we advocate considering three additional mechanisms. First, if the jurisdiction has adopted the “public records” exception to the ban on hearsay, the 2009 Report “Strengthening Forensic Science: A Path Forward” should be admissible as a government report, including its discussion of cognitive bias. Second, in cases where a court determines that the risk of a bias-impaired expert opinion is core or substantial, expert testimony on cognitive bias and its impact should be considered. Third, courts should consider giving a jury instruction regarding cognitive bias and the risk factors that may affect an expert’s judgment and conclusion. This is already somewhat common in eyewitness identification cases where jury instructions on how memory works are now regularly given. There is ample science to support an instruction for evaluating expert cognitive bias.

Whatever tool(s) a judge selects, given the accused’s constitutional right to confrontation and to present a defense, and a court’s duty to ensure a reliable verdict, evidence of cognitive bias of experts and its impact must be admissible and made meaningful.

Increasing the contribution of experts to criminal justice

Experts already make a vital contribution to criminal justice. Beyond the legal issues detailed above, we offer a few practical steps to increase and improve the contributions experts make to the courts: First, it is important to make sure that expert evidence gets its proper and realistic weight within criminal proceedings. By understanding the potentials and limits and the proper scope of expert evidence, criminal justice will be served and enhanced. To this end we recommend that judges, advocates, and all those involved in criminal justice should receive education about the use and limitations of expert evidence. Such education should demystify expertise, explaining its strength as well as its limitation, including its vulnerability to bias and contextual influences.

Second, best practices and standard operating procedures that strengthen expert evidence should be developed. These should include masking extraneous information that is not relevant to the expert’s work. Experts must be blind to information that they do not require and that may influence and bias their work. In cases where contextual information is needed to determine what tests to carry out, or when the expert acts in an investigative capacity, then the work should be divided: one examiner acts as a case manager or as an investigative examiner, while the actual tests and work is carried out by another examiner who is blinded to the contextual information that is not needed or relevant to the actual work being carried out³⁵.

Furthermore, experts should use the ‘Linear Sequential Unmasking’ (LSU) procedure to minimize bias, whereby examiners should first examine evidence from the crime scene in isolation from a ‘target’ suspect³⁶. Evidence from the crime scene should be examined by itself, without the influence of the suspect’s pattern that is the target for making a match (i.e., there is a suspect, or a ‘target suspect’). Only then, after the evidence has been examined ‘context free’,

can it be compared and evaluated in reference to a suspect. By example, a fingerprint examiner should first examine and analyze the fingerprint from the crime scene before being exposed to the fingerprints of the suspect; once the evidence from the crime scene has been analyzed, then it can be compared to the suspect³⁷. Experts should work linearly from the evidence rather than with circular reasoning.

Other best practices and standard operating procedures should include documentation that details the experts' work. Experts doing the actual work should be buffered as much as possible from detectives and others who may influence their work. Any necessary interactions should be kept to a minimum and documented. The conclusions of experts should be blindly verified by other experts. And finally, rather than considering only one hypothesis (typically that of the investigator requesting the testing), experts should consider multiple competing hypotheses. One way to achieve this is to present the expert examiner with a number of plausible matches along with the one from the suspect, and then ask them to conclude which one (if any) matches that from the crime scene. By way of example, if a forensic examiner is trying to match a CCTV image to the face of a suspect, rather than having 'the' target suspect, the examiner can be presented with a few possible (& plausible) matches (not only the suspect) —this is similar to the standard procedure in identification procedures when the suspect is presented within a number of foils.

Third, forensic experts, as well as expert witnesses from other domains, should receive training in cognitive bias and best practices to enhance objectivity and impartiality³⁸. This is to help fulfill the formal duty of experts, e.g., to be objective and unbiased, objectives that can (& should) be achieved as much as possible.

Fourth, a lab's quality management system must incorporate cognitive bias concerns. The UK Forensic Regulator stipulates that "organizations who undertake fingerprint examination should demonstrate within their accredited quality management system that they understand the potential for cognitive bias and build into their technical procedures safeguards to minimize the risk of bias and peer pressure"³⁹. This is an admirable first step, but is not, by itself, sufficient because if they are needed in fingerprinting, then they are likely required in other forensic domains, even in DNA interpretation⁴⁰, as well as in a variety of other expert evidence —such as medical— that require interpretation and involve subjective judgments. Furthermore, the UK Forensic Regulator's stipulations are only guidelines and therefore cannot be enforced⁴¹.

As explained above, it is up to the advocates to explore in cross-examination whether the experts received proper training in cognitive bias and have followed best practices, so as to enable the judge or jury to assign proper weight and credibility to the experts' testimony. Where the influence of irrelevant contextual information is such that no reasonable jury could properly rely on it, then the judge must exclude the evidence⁴². The hope is that such actions will ensure that experts follow best practices in the first place (rather than having their evidence excluded⁴³) and therefore serve the court by providing the best possible and impartial evidence.

Conclusions

The 'human mind is not a camera', and humans have developed a variety of brain mechanisms that enable them to process information effectively and efficiently. These very mechanisms, that

underlie intelligence and expertise, also entail vulnerabilities, such as influences by extraneous information and cognitive biases. It is advisable to consider steps that will ensure that expert evidence is impartial and objective as much as possible, and to avoid cognitive contamination. While much of this work should occur in the labs, some of it will inevitably fall to the courts. Cognitive science can be of service to the courts and criminal justice by helping to understand these issues, and suggesting practical ways to enhance the quality, and hence the contribution, of expert evidence.

Endnotes

- [1.](#) I. E. Dror, “The paradox of human expertise: Why experts get it wrong”. In N. Kapur (Ed.) *The Paradoxical Brain*, Cambridge University Press (2011) 177-188.
- [2.](#) R. Desimone and J. Duncan, “Neural mechanisms of selective visual attention” (1995) *Annual Review of Neuroscience* 18, 193–222; M. Corbetta and G.L. Shulman, “Control of goal-directed and stimulus-driven attention in the brain” *Nature Reviews Neuroscience* (2002) 3, 201–215.
- [3.](#) M.A. Changizi and W.G. Hall, “Thirst modulates a perception” (2001) *Perception* 30, 1489–1497; P.M. Niedenthal, J.B. Halberstadt, J. Margolin, and A.H. Innes-Ker, “Emotional state and the detection of change in facial expression of emotion” (2000) *European Journal of Social Psychology* 30, 211–222.
- [4.](#) M. Bilalić, P. McLeod, and F. Gobet, “The mechanism of the Einstellung (set) effect: A pervasive source of cognitive bias” (2010) *Current Directions of Psychological Science*, 19, 111-115.
- [5.](#) P. Bressan and M.F. Martello, “Talis pater, talis filius: Perceived resemblance and the belief in genetic relatedness” (2002) *Psychological Science* 13, 213-218.
- [6.](#) S.D. Charman, A.H. Gregory, and M. Carlucci, “Exploring the diagnostic utility of facial composites: Beliefs of guilt can bias perceived similarity between composite and suspect” (2009) *Journal of Experimental Psychology: Applied* 15, 76-90.
- [7.](#) To be clear, we are not attributing deliberate actions on anyone’s part, but explain that some cognitive bias is an inherent characteristic and outcome of how the human brain processes information, and that it occurs without consciousness. See *Regina V Jamie Deakin*, [2012] EWCA Crim 2637, where the England and Wales Court of Appeal notes the “very real possibility of unconscious influence.” (Paragraph 25). Sir Thomas Bingham also makes the point that experts are often not objective, “but they are not dishonest”, page 19, T. Bingham, (1985) *Current Legal Problems*.
- [8.](#) The High Court in England and Wales made a note of this issue in the case of *Bento and The Chief Constable of Bedfordshire Police*, where it is stated that “a court must be careful not to be mesmerised by the confidently expressed views of a senior and distinguished expert” [2012] EWHC 1525 (QB) (paragraph 76) Case No: HQ10D01015.

[9.](#) The duty of experts was set out in *National Justice Cia Naviera SA v Prudential Assurance Co Ltd (Ikarian Reefer)* [1993] 2 Lloyd’s Reports 68 at p. 81 —See Blackstone’s Criminal Practice (2013) para F10.35.

[10.](#) “Expert witnesses may be and often are partisan, argumentative and lacking in objectivity” T. Bingham, (1985) Current Legal Problems, page 19.

[11.](#) Indeed, experts’ evaluations have been shown to be influenced by their partisan allegiance, e.g., D.C. Murrie, M.T. Boccaccini, L. A. Guarnera, K. A. Rufino, “Are forensic experts biased by the side that retained them?” (2013) Psychological Science 24.

[12.](#) See, for example, the United States National Academy of Sciences report on forensic science that states that “The degree of science in a forensic science method may have an important bearing on the reliability of forensic evidence in criminal cases. There are two very important questions that should underlie the law’s admission of and reliance upon forensic evidence in criminal trials: (1) the extent to which a particular forensic discipline is founded on a reliable scientific methodology that gives it the capacity to accurately analyze evidence and report findings and (2) the extent to which practitioners in a particular forensic discipline rely on human interpretation that could be tainted by error, the threat of bias, or the absence of sound operational procedures and robust performance standards.” National Academy of Sciences “Strengthening Forensic Science in the United States: A Path Forward” (2009), page 87, Washington, DC: National Academies Press.

[13.](#) See D. Dwyer, “The Judicial Assessment of Expert Evidence” (2008) Cambridge University Press; S. Gross, “Expert evidence” (1991) Wisconsin Law Review 1113-1232; and J. R. Spencer, “Court experts and expert witnesses: have we a lesson to learn from the French?” (1992) Current Legal Problems 45, 213-236.

[14.](#) I. E. Dror and S. Cole, “The vision in ‘blind’ justice: Expert perception, judgment and visual cognition in forensic pattern recognition” (2010) Psychonomic Bulletin & Review 17, 161-167.

[15.](#) I. E. Dror and R. Rosenthal, “Meta-analytically quantifying the reliability and biasability of forensic experts” (2008) Journal of Forensic Sciences 53, 900-903.

[16.](#) I. E. Dror and G. Hampikian, “Subjectivity and bias in forensic DNA mixture interpretation” (2011) Science & Justice 51, 204-208.

[17.](#) Court of Appeal, R v Dlugosz, R v Pickering & R v MDS, [2013] EWCA Crim 2, (Para 26), Case No: 2011/04122/C2, 2012/03728/B1, 2012/02955/D4.

[18.](#) Court of Appeal, supra note 20, at para 26.

[19.](#) E.g., in forensic odontology, see M. Page, J. Taylor, and M. Blenkin, “Context effects and observer bias—Implications for forensic odontology” (2012) Journal of Forensic Sciences 57, 108–112; in forensic anthropology, see S. Nakhaeizadeh et al., “The power of contextual effects

in forensic anthropology: A study of biasability in the visual interpretations of trauma analysis on skeletal remains” (2013) *Journal of Forensic Sciences* 58.

[20.](#) Forensic Regulator, “Developing a quality standard for fingerprint examination” (2011) Fingerprint Quality Standards Specialist Group (20 December 2011) page 12, United Kingdom (available at: <http://www.homeoffice.gov.uk/publications/agencies-public-bodies/fsr/dev-quality-std-fingerprint-exam?view=Binary>).

[21.](#) “Expert working group on human factors in latent print analysis” (2012) U.S. National Institute of Standards and Technology (NIST) (available at: http://www.nist.gov/customcf/get_pdf.cfm?pub_id=910745).

[22.](#) See, for example, the case of Regina V Jamie Deakin, [2012] EWCA Crim 2637, where the Court of Appeal notes that “A matter of particular concern, in this court’s view, is that Police Constable Gorringe had actually told Detective Constable Churton shortly prior to his examining the CCTV to see if he could recognise the appellant... This was highly suggestive and should never have happened... very real possibility of unconscious influence.” (Paragraph 25).

[23.](#) In one case, for example, Dwayne Jackson confessed to a crime he did not commit after he was erroneously identified in DNA testing by Las Vegas forensic examiners, see L. Mower and D. McMurdo, “Las Vegas police reveal DNA error put wrong man in prison” (2011) *Las Vegas Review Journal*, July 7.

[24.](#) I. E. Dror, “Cognitive bias in forensic science” 2012 *Science & Technology Yearbook*, 43-45, McGraw-Hill; S. M. Kassin, I. E. Dror, and J. Kukucka, “The forensic confirmation bias: Problems, perspectives, and proposed solutions” (2013) *Journal of Applied Research in Memory and Cognition* 2, 42-52; I. E. Dror, S. M. Kassin, and J. Kukucka, “New application of psychology to law: Improving forensic evidence and expert witness contributions” (2013) *Journal of Applied Research in Memory and Cognition* 2, 78-81; S.F. Kelty, R. Julian, and A. Ross, “Dismantling the Justice Silos: Avoiding the pitfalls and reaping the benefits of information-sharing between forensic science, medicine and law” 2013 *Forensic Science International*.

[25.](#) *United States v. Abel*, 469 U.S. 45, 52 (1984).

[26.](#) *Cholakyan v. Mercedes-Benz USA*. 281 F.R.D. 534, 547 (C.D. Cal. 2012)

[27.](#) See, e.g., *Wise v. Ludlow*, 346 P.3d 1, 15 (Wyo. 2015) (“If Dr. Brunworth did not correctly follow the methodology of differential diagnosis, that could affect the weight and persuasiveness of her opinions, but does not render that evidence inadmissible under Daubert”).

[28.](#) *State v. Bernstein*, 349 P.3d 200, 203 (Ariz. 2015)

[29.](#) *Murray v. Motorola, Inc.*, 2014 D.C. Super. LEXIS 16, *90 (D.C. Super. Ct. 2014)

[30.](#) *Daubert*, 509 U.S. at 596.

- [31.](#) 373 U.S. 83 (1963)
- [32.](#) *Kyles v. Whitley*, 514 U.S. 419 (1995)
- [33.](#) 415 U.S. 308 (U.S. 1974)
- [34.](#) *In re Anthony P.*, 167 Cal. App. 3d 502, 511 (Cal. App. 2d Dist. 1985)
- [35.](#) See detail of this solution and others, at: I.E. Dror “Practical Solutions to Cognitive and Human Factor Challenges in Forensic Science” 2014 Forensic Science Policy & Management, 4, 105-113.
- [36.](#) I.E. Dror, W.C. Thompson, C.A. Meissner, I. Kornfield, D. Krane, M. Saks, M. Risinger, “Context Management Toolbox: A Linear Sequential Unmasking (LSU) Approach for Minimizing Cognitive Bias in Forensic Decision Making” (2015) Journal of Forensic Sciences, 60 (4), 1111-1112.
- [37.](#) In the case of Regina V Peter Kenneth Smith, [2011] EWCA Crim 1296, the Court of Appeal of England and Wales has quashed a murder conviction because fingerprint evidence was biased as a result of a ‘target’ suspect affecting the evaluation of the evidence. When the evidence was examined in isolation (prior to having a suspect), the fingerprint examiner determined that “there was insufficient detail to be able to make a meaningful comparison” (Paragraph 14), but then “after the appellant had been charged... he concluded that the ridge flow and 12 ridge characteristics could be identified with the fingerprint from the appellant’s left forefinger.” (Paragraph 15). That is, the examiner ‘revised’ their conclusions, changing from insufficient to an identification once there was a suspect. Research studies have also shown the effect of a ‘target’ comparison on the analysis of the evidence, See I. E. Dror, et al. “Cognitive issues in fingerprint analysis: Inter-and intra-expert consistency and the effect of a ‘target’ comparison” (2011) Forensic Science International, 208, 10-17.
- [38.](#) See the recommendation to provide such training by both the Fingerprint Inquiry Report (Recommendation 7), as well as the NIST/NIJ Expert Group Report (Recommendation 8.5). A. Campbell, “The fingerprint inquiry report” (2011) (available at: <http://www.thefingerprintinquiryscotland.org.uk/inquiry/3127-2.html>) and the Expert working group on human factors in latent print analysis” (2012) U.S. National Institute of Standards and Technology (NIST). We are pleased to note that a number of police departments and agencies now provide their forensic examiners with such cognitive training.
- [39.](#) Forensic Regulator (2011), page 12.
- [40.](#) Court of Appeal, *supra* note 23; and Dror and Hampikian, *supra* note 22.
- [41.](#) Likewise are the conclusions and recommendation of the Public Judicial Inquiry by Sir Anthony Campbell (e.g. “Unless the provision of contextual information is absolutely necessary, it should be avoided”, page 628).

[42.](#) See the Court of Appeal’s statement that “with all respect to the judge, his statement that in “an ideal world” not naming the appellant would have been “the perfect situation” is difficult to understand: that solution could easily have been adopted in this present case.” Regina V Jamie Deakin, [2012] EWCA Crim 2637 (Paragraph 25).

[43.](#) Or having the Court of Appeal squash convictions because of biased expert evidence, see, e.g., Regina V Peter Kenneth Smith, [2011] EWCA Crim 1296, and Regina V Jamie Deakin, [2012] EWCA Crim 2637.