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Justice in a Brave New World?

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As science fiction has become reality, we should consider the implications of our new technologies for our system of justice. In addition to DNA, we are now regularly using cameras, geo-tracking, facial recognition software, brain scans, computers, and much more to discern and record our physical and mental surroundings. Existing technology and more we cannot yet imagine will increasingly take the place of often unreliable evidence, such as that provided by eyewitnesses. Yet, we have given far too little thought as to how these advances should impact our civil and criminal dispute resolution systems.

Historically, many justice systems have emphasized the importance of finding the truth. Our new forms of technology will arguably help us discover the truth, and thereby potentially enhance justice. Upon reflection, however, it is not clear that our scientific innovations will necessarily yield greater truth, much less justice. The products of our technology will inevitably be subject to human interpretation and argument, and justice has always been about far more than truth.

This Article argues that we should focus on three critically important issues as we consider how to redesign our system of justice to accommodate our new technology. First, recognizing that judges and jurors will often lack the competence to interpret scientific data, we should rely more heavily on neutral scientific experts. Second, in light of the psychology of multiple interpretations, we will want to ensure that our technological evidence is interpreted by a diverse audience. Third, the greatest contribution of our powerful new technology may be that it helps us recognize that justice involves much more than finding the truth. Even assuming we could agree on what happened in the past, alternative visions of justice influence how a community will want to deal with past events, such as through punishment, compensation, reparations, apology, or in other ways. By deemphasizing the centrality of truth, we can focus more on other important aspects of justice, including examining motivations, healing community rifts, enunciating community norms, providing procedural justice, protecting human rights, and providing cost-effective access to our dispute resolution system. Focusing on this broad array

of concerns will encourage us to reform our litigation system in creative ways and also to rely more heavily on non-litigation approaches to justice.

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Justice in a Brave New World?

JEAN R. STERNLIGHT *

INTRODUCTION

A man was recently charged with a 1993 murder based on DNA obtained from a napkin he discarded at a hockey game.¹ As science fiction has become reality, we must consider the implications of new technology for our system of justice. In addition to DNA, we are now regularly using cameras, geo-tracking, facial recognition software, brain scans, and more to discern and record our physical and mental surroundings.² Our phone records, financial transactions, and social media are preserved not only in our devices but also in the “cloud.”³ We are even developing the capabilities to read emotions⁴ and memories.⁵ This technology and more we cannot yet imagine will increasingly take the place of often unreliable evidence, such as eyewitness testimony.⁶ Yet, while these technological advances are amazing, we have given far too little thought to how these scientific developments should impact our approach to civil and criminal conflicts.

Historically, many justice systems have emphasized the importance of finding the truth. Whether through trials by ordeal, oaths, or more modern trials, we have endeavored to find out who did what to whom and why. Part I summarizes this historical focus and then describes how new technology

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¹ Sarah Mervosh, *DNA From Napkin Used at Hockey Game Leads to Charge in a 1993 Murder*, N.Y. TIMES, Feb. 18, 2019, at A9 (describing law enforcement’s use of genealogical databases to identify suspects). Similar technology was famously used to apprehend the alleged Golden State Killer, who was charged with murdering, raping, and burglarizing victims over several decades. *See infra* text accompanying note 72.

² *See infra* Section I.B.

³ *See infra* text accompanying note 61.

⁴ *See infra* text accompanying note 58. *See also infra* Section I.B.2 (discussing a variety of technologies used to directly and indirectly assess what people are thinking).

⁵ *See infra* text accompanying notes 110–26.

⁶ *See, e.g.*, Elizabeth F. Loftus, *Eyewitness Science and the Legal System*, 14 ANN. REV. L. & SOC. SCI. 1, 5 (2018) (explaining that the development of DNA testing shed light on the fallibility of eyewitness testimony).

will arguably help us discover the truth, thereby potentially enhancing justice.⁷

Upon reflection, however, it is not clear that our scientific innovations will necessarily yield greater truth, much less justice. Part II.A explains that for technical, psychological, and philosophical reasons, new technology will not necessarily help us find truth. From a technical standpoint, mistakes will be made, and results can even be faked. Psychologically, even the most brilliant of technologies will ultimately be designed and interpreted by humans and thus be subject to human biases. Philosophically, perhaps any search for ultimate truth is doomed because no single truth exists.

Part II.B argues that to the extent our new technology may help us find truth, its greater contribution, ironically, may be that it helps us recognize that justice involves much more than truth. Even assuming we could agree on what happened in the past, alternative visions of justice influence how a community will want to deal with that past, such as through punishment, compensation, reparations, apology, or in other ways. Both currently and historically, trials have never focused exclusively on truth. As well, non-adjudicatory processes such as mediation, negotiation, or community conferences have always emphasized aspects of justice other than truth. Whereas trials are generally structured to yield a single answer, other forms of dispute resolution are premised on recognition of complexity—that multiple truths can exist and that alternative solutions are possible.

Finally, Part III considers how we ought to redesign our system of dispute resolution⁸ to accommodate our new technology and achieve greater justice. It suggests we look for processes to help us deal with three critically important issues: the inevitable fallibility of the technology, the psychology and philosophy of multiple interpretations, and the goals of dispute resolution that reach beyond merely finding the truth. By encouraging us to contemplate these and other issues, perhaps our technological innovations can help spark a rethinking of our system of justice that is even more exciting and innovative than the new technology itself.

I. A FIRST TAKE—OUR NEW TECHNOLOGY WILL ENABLE TRIALS TO FULFILL THEIR PURPOSE OF UNCOVERING TRUTH

A. *Trials' Purpose of Uncovering Truth*

In both the criminal and civil context,⁹ we often use trials to try to figure

⁷ While the privacy implications of our new technology are also both fascinating and disconcerting, that is not the subject of this Article.

⁸ This Article uses the phrase “dispute resolution” to refer to both litigation and alternatives thereto, such as negotiation, mediation, and arbitration.

⁹ While our society in the United States draws a sharp distinction between criminal and civil disputes, many other societies do not.

out who did what to whom or what and why, as well as to assess the impact of such actions.¹⁰ In the seventeenth century, Chief Justice Coke claimed that trials are “the finding out by due examination of the truth of the point in issue.”¹¹ Indeed, “[i]n its widest meaning the word ‘trial’ is synonymous with ‘test,’” such as a scientific examination.¹² More recently, Judge Marvin Frankel simply stated: “Trials occur because there are questions of fact. In principle, the paramount objective is the truth.”¹³ While trials are clearly designed to do justice, as well as to seek truth, it is clear that truth-seeking lies at the heart of many legal disputes.¹⁴

¹⁰ Admittedly, trials have become a rarity in both the civil and criminal context in the United States. As to civil trials, see, e.g., John H. Langbein, *The Disappearance of Civil Trial in the United States*, 122 YALE L.J. 522, 524 (2012); Marc Galanter & Angela Frozena, *The Continuing Decline of Civil Trials in American Courts*, POUND CIV. JUST. INST. 3–6 (2011), <http://www.poundinstitute.org/wp-content/uploads/2019/04/2011-Forum-Galanter-Frozena-Paper-1.pdf> (last visited Aug. 28, 2019). As to criminal trials, recent federal statistics show just over two percent of cases going to jury trial. *Federal Judicial Caseload Statistics: Table D-4. U.S. District Courts—Criminal Defendants Disposed of, by Type of Disposition and Offense, During the 12-Month Period Ending March 31, 2017*, U.S. CTS. (Mar. 31, 2017), https://www.uscourts.gov/sites/default/files/data_tables/fjcs_d4_0331.2017.pdf. State statistics are similar. See BRIAN A. REAVES, U.S. DEP’T OF JUSTICE BUREAU OF JUSTICE STATISTICS, FELONY DEFENDANTS IN LARGE URBAN COUNTIES, 2009 – STATISTICAL TABLES 24 tbl.21 (2013), <https://www.bjs.gov/index.cfm?ty=pbdetail&iid=4845> (showing two percent of felony convictions resulted from trials). Nonetheless, trials remain important because they are the backdrop for both settlements, see, e.g., Robert H. Mnookin & Lewis Kornhauser, *Bargaining in the Shadow of the Law: The Case of Divorce*, 88 YALE L.J. 950, 968–69 (1979), and dispositive motions such as motions for summary judgment. Prosecutors consider how evidence would play to a jury in deciding which cases to bring, how to structure those cases, and whether to enter into plea negotiations. Anna Offit, *Prosecuting in the Shadow of the Jury*, 113 NW. L. REV. 1071, 1072–73 (2019).

¹¹ 1 JUDICIAL TRIBUNALS IN ENGLAND AND EUROPE, 1200–1700: THE TRIAL IN HISTORY 5 (Maureen Mulholland & Brian Pullan eds., 2003) (internal quotation marks omitted). See also JEROME FRANK, COURTS ON TRIAL: MYTH AND REALITY IN AMERICAN JUSTICE 80 (1950) (questioning trials’ ability to find truth); Charles Nesson, *The Evidence or the Event? On Judicial Proof and the Acceptability of Verdicts*, 98 HARV. L. REV. 1357, 1360 (1985) (“A trial is ostensibly structured as a truth-seeking process concerned with justice for the parties.”).

¹² Mulholland & Pullan, *supra* note 11, at 2 (discussing the use of “trials” to test faith, in the Old Testament, and describing the use of trials in scientific contexts, to evaluate data). In medieval England the “why” was at least as important as the “what.” Juries focused substantially on the hearts and minds of the accused, and acquitted most accused. ELIZABETH PAPP KAMALI, FELONY AND THE GUILTY MIND IN MEDIEVAL ENGLAND 1–2 (2019).

¹³ Marvin E. Frankel, *The Search for Truth: An Umpireal View*, 123 U. PA. L. REV. 1031, 1033 (1975) (contending that while truth is the theoretical goal, in practice our adversarial system does not serve the goal as well as it might, and therefore suggesting potential reforms to our adversarial system). Cf. Monroe H. Freedman, *Judge Frankel’s Search for Truth*, 123 U. PA. L. REV. 1060, 1063 (1975) (urging that while a trial is, in part, a search for truth, it also serves many other purposes including protecting the dignity interests and constitutional rights of the parties).

¹⁴ Cf. John Thibaut & Laurens Walker, *A Theory of Procedure*, 66 CALIF. L. REV. 541, 541–42 (1978) (asserting that distributive and procedural justice are more central in most legal disputes than is the determination of truth). While Thibaut and Walker assert that a small category of disputes involve “strong elements of both truth and justice claims,” *id.* at 542, I believe that many if not most legal claims involve disputes as to both truth and justice. See also Justin Sevier, *A [Relational] Theory of Procedure*, 104 MINN. L. REV. (forthcoming 2020) (manuscript at 54), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3405763 (drawing on empirical studies to critique

Until recently, we typically relied on witness testimony, physical evidence, or (longer ago) purported supernatural insights to try to find the truth. In some societies, disputes have been resolved by community members who might have personal knowledge of the events that transpired or the character of the disputants.¹⁵ When personal knowledge was scant, trials by ordeal, trials by battle,¹⁶ and oaths¹⁷ were sometimes used to try to determine who was lying and who was telling the truth. One common ordeal required accused criminals to plunge their arms into boiling water to retrieve a ring, as a means of determining whether the accused had committed the crime.¹⁸ If the arm of the accused was not harmed, he was found not guilty, on the theory that God had protected the arm of an innocent man.¹⁹ Such trials were used not only in medieval Europe but also in various other parts of the world.²⁰ Although trials by ordeal today sound both sadistic and absurd, one economist has argued they may have been a fairly effective

Thibaut and Walker's truth-justice dichotomy as incomplete and asserting instead that the public's perception of legal disputes depends upon both the nature and stage of the dispute).

¹⁵ E.g., JAMES OLDHAM, TRIAL BY JURY: THE SEVENTH AMENDMENT AND ANGLO-AMERICAN SPECIAL JURIES 3 (2006).

¹⁶ See, e.g., Morton W. Bloomfield, *Beowulf, Byrhtnoth, and the Judgment of God: Trial by Combat in Anglo-Saxon England*, 44 SPECULUM 545, 551 (1969) ("Trial by combat and ordeals in general were methods used to get at the truth when oaths or compurgation would not elicit an unambiguous answer."). With trial by battle, "God was expected to support the truthful combatant." VICKIE L. ZIEGLER, TRIAL BY FIRE AND BATTLE IN MEDIEVAL GERMAN LITERATURE 8 (2004).

¹⁷ The medieval oath essentially took the place of witness testimony in that a sworn oath on relevant matters had to be accepted and would end the legal dispute. See Rebecca V. Colman, *Reason and Unreason in Early Medieval Law*, 4 J. INTERDISC. HIST. 571, 576 (1974) ("The majority of civil and criminal cases were settled by oath-swearing . . ."). However, while oaths were commonly used to resolve cases, Colman reports that the preferred means to resolve disputes was "certain proof," with oath-swearers or ordeal to be used only when certain proof was not available. *Id.* at 578–79.

¹⁸ See Trisha Olson, *Of Enchantment: The Passing of the Ordeals and the Rise of the Jury Trial*, 50 SYRACUSE L. REV. 109, 115–17 (2000) (discussing the use of ordeals as a method of proof in medieval Europe and use of the "ordeal of the cauldron"). Although medieval Europeans employed trials by ordeal, these were not the primary means by which they resolved disputes. Rather, European societies used non-ordeal trials as well as various forms of mediation and negotiation throughout the period when they also relied on ordeals. See, e.g., THE SETTLEMENT OF DISPUTES IN EARLY MEDIEVAL EUROPE 236–37 (Wendy Davies & Paul Fouracre eds., 1986).

¹⁹ See, e.g., ROBERT BARTLETT, TRIAL BY FIRE AND WATER: THE MEDIEVAL JUDICIAL ORDEAL 1 (1986). This belief, that God would protect the innocent, was called *iudicium Dei* (judgment of God). Peter T. Leeson, *Ordeals*, 55 J.L. & ECON. 691, 692 (2012). Additional ordeal practices included having the accused grasp or walk on a red-hot piece of iron to see if they would remain unscathed or throwing the accused into water to see if they would demonstrate their innocence by sinking. BARTLETT, *supra*, at 2.

²⁰ See, e.g., BARTLETT, *supra* note 19, at 2 ("Ordeals of fire and water have been employed by peoples in many different parts of the world and throughout history. They crop up in the laws of Hammurabi and in the judicial practice of modern Kenya; men have undergone the ordeal from Iceland to Polynesia, from Japan to Africa."); H. GOITEIN, PRIMITIVE ORDEAL AND MODERN LAW 54–55, 58–60 (1923) (discussing uses of ordeals by a broad range of societies including Hindu, Siamese, Iranian, African, European, and others).

means of uncovering the truth.²¹ In a world where everyone believes in God's power to determine truth and make that truth known, only the innocent would typically willingly subject themselves to ordeals.²²

As our ancestors' faith in the supernatural lapsed,²³ they instituted more rationally-based inquisitorial and adversarial trials in front of either judges or juries. In the inquisitorial system, used in most parts of Europe²⁴ and commonly throughout the world,²⁵ the judge generally conducts hearings, determines the law, examines witnesses and experts, and orders the production of relevant documents.²⁶ The role of the judge is highlighted in the inquisitorial system because it is thought that judges, more than disputants or attorneys, will place the appropriate emphasis on finding the truth.²⁷

Similarly, those who favor the adversarial approach to trials urge that litigation brought between adverse parties is analogous to gladiators' competition and is even more successful than inquisition in uncovering the truth.²⁸

²¹ Leeson, *supra* note 19, at 711.

²² *Id.* at 697–98 (employing rational choice theory to investigate the relationship between superstition and law and suggesting that the priests who set up the trials may have knowingly or unknowingly manipulated them to ensure that at least most of the defendants would be found to have passed the trial).

²³ Pope Innocent III and the Fourth Lateran Council of the Church banned the use of trials by ordeal in 1215 on the ground that they were inconsistent with scripture. Finbarr McAuley, *Canon Law and the End of the Ordeal*, 26 OXFORD J. LEGAL STUD. 473, 499, 508–11 (2006).

²⁴ Trials by jury became common in England and trials by inquisition in the rest of Europe. 2 FREDERICK POLLOCK & FREDERIC WILLIAM MAITLAND, *THE HISTORY OF ENGLISH LAW BEFORE THE TIME OF EDWARD I* 138–44 (2d ed. 1923).

²⁵ While U.S. commentators typically look to Germany or France to gain an understanding of the inquisitorial approach, some have noted that we have significant inquisitorial elements in our own system. The equity system used in the early years of this country was primarily inquisitorial, and the more recent reliance on managerial judges and magistrates can also be seen as a rejuvenation of the inquisitorial tradition. See Amalia D. Kessler, *Our Inquisitorial Tradition: Equity Procedure, Due Process, and the Search for an Alternative to the Adversarial*, 90 CORNELL L. REV. 1181, 1225 (2005) (describing the “transformation” of the adversary system).

²⁶ *Id.* at 1188; John H. Langbein, *The German Advantage in Civil Procedure*, 52 U. CHI. L. REV. 823, 827 (1985) (“Digging for facts is primarily the work of the judge.”). Although the parties and their attorneys may make suggestions, it is typically thought unethical for lawyers to “prepare” witnesses for their testimony. Mirjan Damaška, *Presentation of Evidence and Factfinding Precision*, 123 U. PA. L. REV. 1083, 1088–89 (1975); W. Zeidler, *Evaluation of the Adversary System: As Comparison, Some Remarks on the Investigatory System of Procedure*, 55 AUSTRALIAN L.J. 390, 394 (1981).

²⁷ See Langbein, *supra* note 26, at 847 (urging that factfinding is the central task of civil litigation and that an inquisitorial system is more likely than an adversarial system to be effective in determining truth); see also Justin Sevier, *The Truth-Justice Tradeoff: Perceptions of Decisional Accuracy and Procedural Justice in Adversarial and Inquisitorial Legal Systems*, 20 PSYCHOL. PUB. POL'Y & L. 212 (2014) (summarizing conflicting literature on the relative strength of the adversarial and inquisitorial justice systems in finding truth, but concluding that Americans tend to believe inquisitorial systems are better at finding truth and adversarial systems are better at providing justice).

²⁸ See, e.g., Lon L. Fuller, *The Forms and Limits of Adjudication*, 92 HARV. L. REV. 353, 383–84 (1978) (explaining how an advocate “plays his role” in the adversary system); Gerald Walpin, *America's*

In the adversarial model the parties are responsible for initiating and conducting the litigation. They gather all the evidence and present it orally, in open court, subjecting witnesses to examination and cross-examination, and the court serves as a neutral umpire, deciding the questions of fact and law raised by the parties.²⁹

Indeed, the Supreme Court has asserted that cross examination is “the greatest legal engine ever invented for the discovery of truth.”³⁰ The jury often plays an important role in the adversarial system. Initially, English juries were composed of community members who “came from the neighborhood, and some of them, at least, were expected to know or to find out the facts of the dispute in litigation, rather than to reach a verdict based exclusively on evidence introduced in court.”³¹ Later, juries evolved to base their deliberations only on evidence produced in court, but still focused on ferreting out the truth.³²

In short, while the forms of trials have changed over the years, we have frequently emphasized the goal of trials to uncover the truth of what occurred in the past.³³ This quest for truth is also reflected in our due process jurisprudence, which highlights the need to provide procedures that will lead to truthful and accurate findings.³⁴

B. *New Technology Can Aid in the Search for Truth*

On first impression it seems obvious that our new world of technology will make it far easier to figure out who did what to whom, and why. Where

Adversarial and Jury Systems: More Likely to Do Justice, 26 HARV. J.L. & PUB. POL’Y 175, 176–78 (2003) (discussing the “attributes” of the roles in an adversary system, including the need to “neutralize or destroy” evidence unfavorable to a client’s case).

²⁹ Kessler, *supra* note 25, at 1188 (citations omitted). See also Lon L. Fuller, *The Adversary System*, in TALKS ON AMERICAN LAW 34, 34 (Harold Berman ed., 1971) (calling the adversary system “a philosophy that insists on keeping distinct the function of the advocate . . . from that of the judge, or of the judge from that of jury”); STEPHAN LANDSMAN, THE ADVERSARY SYSTEM: A DESCRIPTION AND DEFENSE 49 (1984) (explaining that the parties initiate the proceedings and lawyers gather information, but the judge is the most important player in the adversarial model); Roscoe Pound, *The Causes of Popular Dissatisfaction with the Administration of Justice*, 14 AM. LAW. 445, 447 (1906) (calling the adversary system a “sporting theory” of justice).

³⁰ See, e.g., *California v. Green*, 399 U.S. 149, 158 (1979) (quoting 5 WIGMORE § 1367).

³¹ OLDHAM, *supra* note 15, at 3. Such juries were said to be “self-informing.”

³² *Id.* (estimating that this “modern” jury emerged in the 1500s).

³³ See generally John D. Jackson, *Theories of Truth Finding in Criminal Procedure: An Evolutionary Approach*, 10 CARDOZO L. REV. 475 (1988) (summarizing ongoing debate over whether inquisitorial or instead adversarial processes are better at uncovering the truth).

³⁴ See, e.g., *Joint Anti-Fascist Refugee Comm. v. McGrath*, 341 U.S. 123, 171–72 (1951) (Frankfurter, J., concurring) (“No better instrument has been devised for arriving at truth than to give a person in jeopardy of serious loss notice of the case against him and opportunity to meet it.”).

we once depended upon such limited evidence as eyewitness testimony,³⁵ confessions,³⁶ and documents, over time we also began to look at skid marks, dents, bullet casings, footprints, and similar physical evidence.³⁷ Next, the development of purportedly more reliable evidence, including fingerprint analysis,³⁸ lie detectors,³⁹ and particularly DNA analysis,⁴⁰ has offered many more tools to determine who did what, where, when, and to some degree why. While many of these tools are far less powerful than many may assume,⁴¹ juries these days tend to crave the supposed certainty of such evidence—what some have called the “CSI effect.”⁴²

Technology emerging today is more ubiquitous and more powerful, thus potentially helping us to better answer these “what happened” questions in both the civil and criminal context.⁴³ Given the rapid arc of technological development,⁴⁴ it is clear that we will soon have even more investigatory

³⁵ Gary L. Wells & Eric P. Seelau, *Eyewitness Identification: Psychological Research and Legal Policy on Lineups*, 1 PSYCHOL. PUB. POL’Y & L. 765, 765 (1995) (“[M]istaken eyewitness identification is the single largest source of wrongful convictions.”).

³⁶ See generally Saul M. Kassin et al., *Police-Induced Confessions: Risk Factors and Recommendations*, 34 L. & HUM. BEHAV. 49 (2010) (reviewing literature on police-induced confessions and risk factors for error).

³⁷ It turned out much of this evidence was not as good as we thought, though DNA identifications can be quite helpful. For a damning critique of some of the technology upon which we have relied, see Michael Saks & David Faigman, *Failed Forensics: How Forensic Science Lost Its Way and How It Might Yet Find It*, 4 ANN. REV. L. & SOC. SCI. 149, 154–56 (2008). See also NAT’L RESEARCH COUNCIL OF THE NAT’L ACADS. OF SCIS., ENG’G, & MED., *STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD* (2009) [hereinafter NAS REPORT] (discussing the findings of a congressionally authorized forensic study); D. Michael Risinger, *Whose Fault?—Daubert, the NAS Report and the Notion of Error in Forensic Science*, 38 FORDHAM URB. L.J. 519, 519 n.3 (2010) (discussing the NAS Report).

³⁸ See *infra* text accompanying note 61–66.

³⁹ See *infra* text accompanying note 99–103.

⁴⁰ DNA analysis has been widely used to exonerate the innocent. BRANDON L. GARRETT, *CONVICTING THE INNOCENT: WHERE CRIMINAL PROSECUTIONS GO WRONG* 216 (2011); see also *When They See Us*, NETFLIX (2019), <https://www.netflix.com/title/80200549> (Netflix series discussing eventual use of DNA as well as confession to exonerate five young men infamously accused and convicted of raping a Central Park jogger).

⁴¹ See *infra* Section I.B.1.

⁴² See, e.g., Simon A. Cole & Rachel Dioso-Villa, *Investigating the ‘CSI Effect’ Effect: Media and Litigation Crisis in Criminal Law*, 61 STAN. L. REV. 1335, 1336–37 (2009) (discussing the “CSI effect”); N.J. Schweitzer & Michael J. Saks, *The CSI Effect: Popular Fiction about Forensic Science Affects the Public’s Expectations About Real Forensic Science*, 47 JURIMETRICS 357, 357–58 (2007) (discussing the CSI effect and a study that found that CSI viewers were more critical of forensic evidence at trial). However, while the media is well convinced that the CSI effect is real, not all legal scholars and investigators are sure that it is. Cole & Dioso-Villa, *supra*, at 1340–42.

⁴³ See *infra* Section I.B.1.

⁴⁴ See, e.g., W. BRIAN ARTHUR, *THE NATURE OF TECHNOLOGY: WHAT IT IS AND HOW IT EVOLVES* 191–200 (2009) (discussing how the economy evolves with technology); RAY KURZWEIL, *THE SINGULARITY IS NEAR: WHEN HUMANS TRANSCEND BIOLOGY* 51–56 (2006) (explaining the life cycle of technology).

tools. The next sections discuss both technologies geared to track past events and also those designed to access the human brain.

1. *The Technology of What Happened*

Our new technology provides us with three ways to learn who did what, when, and where. First, devices record our actions and communications. Second, we can identify physical traces that we leave as we move through the world. Third, technology allows us to be followed in real time as we move through the physical world and as we take actions using that technology.

i. Recording Devices

Computers, phones, cameras, audio recording devices, and other kinds of recording tools play a greater and greater role in figuring out who did what, when, and to whom.⁴⁵ In this country and others,⁴⁶ many public and private entities are placing cameras on streets, within public buses, and inside and outside buildings, so that if “something” happens, a record will exist.⁴⁷ A few years ago cameras on a public bus, outside a gym, at a tollbooth, and at an ATM, were used to track down the alleged killers of a law professor who was mysteriously murdered in his driveway in Tallahassee, Florida.⁴⁸ Another better-known example was law enforcement’s use of commercial and bystander photos to catch the Boston Marathon bombers in 2013.⁴⁹ Today, when crimes happen, it is becoming

⁴⁵ See RANDOLPH LEWIS, UNDER SURVEILLANCE: BEING WATCHED IN MODERN AMERICAN 2 (2017) (discussing the “many different faces” of Big Brother); Robert Draper, *They Are Watching You—and Everything Else on the Planet*, NAT’L GEOGRAPHIC (Feb. 2018), <https://www.nationalgeographic.com/magazine/2018/02/surveillance-watching-you/> (describing the use of CCTV monitoring in London to capture two gang members).

⁴⁶ London has an extensive CCTV system of cameras “used to tackle crime and anti-social behaviour.” CCTV, CITY LONDON POLICE, <https://www.cityoflondon.police.uk/advice-and-support/Pages/Public-Space-Surveillance-Camera-System.aspx> (last visited Feb. 10, 2019) (stating that the City of London Police control room monitors 100 public space surveillance cameras across the City of London, with the capability of moving 360 degrees and positioned so that they do not intrude into private areas).

⁴⁷ See, e.g., Rick Rojas, *In Newark, Police Cameras, and the Internet, Watch You*, N.Y. TIMES (June 9, 2018), <https://www.nytimes.com/2018/06/09/nyregion/newark-surveillance-cameras-police.html> (“In Chicago, the police have established surveillance centers where officers can watch incoming feeds from some 30,000 closed-circuit cameras.”); 7 *Chilling Crimes That Were Solved Thanks to Surveillance Cameras*, HUFFPOST (Feb. 10, 2015, 12:00 AM), http://www.huffingtonpost.com/2015/02/10/chilling-crimes-caught-on-camera_n_6357324.

⁴⁸ Sean Rossman, *Prius Trailed Dan Markel on Final Morning*, TALLAHASSEE DEMOCRAT (June 2, 2016, 10:47 AM), <https://www.tallahassee.com/story/news/2016/06/02/dan-markels-final-morning/85290112>.

⁴⁹ See Patrick J. Kiger, *How They Identified the Bombers*, NAT’L GEOGRAPHIC (Apr. 1, 2014), <http://channel.nationalgeographic.com/inside-the-hunt-for-the-boston-bombers/articles/how-they-identified-the-bombers/> [<http://perma.cc/ED45-9DTA>] (explaining how video footage from various sources allowed law enforcement to identify and apprehend the bombing suspects).

common for police to ask businesses and individuals to check and preserve their video recordings in order to help find the perpetrators.⁵⁰ In addition to fixed cameras, we know that many individuals record events with their phones.⁵¹ Police officers and police vehicles are increasingly equipped with cameras and audio.⁵² Robots, toys, and other machines that are increasingly part of our lives also may contain cameras and audio.⁵³ Law enforcement, family, nosy neighbors, or others may also be able to film what we are doing using miniature insect-sized drones.⁵⁴ As cameras become even smaller and easier to use, we can expect that they will become ubiquitous, as illustrated in the 2017 movie, *The Circle*.⁵⁵

In addition to cameras, other devices are increasingly being used to record human activity. For example, law enforcement is employing facial recognition and iris or retinal scans⁵⁶ to identify persons based on their

⁵⁰ Faith Karimi, *Home Surveillance Cameras Are the New Neighborhood Watch*, CNN (Aug. 31, 2018, 2:11 AM), <https://www.cnn.com/2018/08/30/us/home-surveillance-cameras-neighborhood-watch/index.html> (“In Illinois, the O’Fallon Police Department asked residents to help fight crime by investing in neighborhood surveillance cameras and registering them with authorities. ‘Video surveillance is one of the best methods for apprehending criminals and convicting suspects who are caught in the act of committing a crime,’ the O’Fallon Police Department said in a statement.”).

⁵¹ See, e.g., Lindsey Bever, *Man Who Filmed S.C. Police Shooting: Maybe God ‘Put Me There for Some Reason’*, WASH. POST (Apr. 9, 2015), https://www.washingtonpost.com/news/morning-mix/wp/2015/04/09/meet-the-man-whose-video-led-to-murder-charge-against-south-carolina-cop/?noredirect=on&utm_term=.52d2ea729264 (reporting on Feidin Santana’s decision to record a white police officer firing his pistol at a fleeing, unarmed black man); see also Rose Eveleth, *How Many Photographs of You Are Out There in the World?*, ATLANTIC (Nov. 2, 2015), <https://www.theatlantic.com/technology/archive/2015/11/how-many-photographs-of-you-are-out-there-in-the-world/413389/> (noting that snapchat users share 8796 photos every second and, in 2013, Facebook users uploaded more than 350 million images each day).

⁵² See MARY D. FAN, CAMERA POWER: PROOF, POLICING, PRIVACY, AND AUDIOVISUAL BIG DATA 8 (2019) (examining phenomenon of “toutveillance”—a society in which “people and the police are recording each other from all directions, making everyone at once surveilled and surveiller”); Mary D. Fan, *Privacy, Public Disclosure, Police Body Cameras: Policy Splits*, 68 ALA. L. REV. 395, 399 (2016) (“Law enforcement agencies are rapidly getting on the body camera bandwagon because officers are realizing that recording encounters can help rebuild public trust, improve public as well as officer behavior, and protect against false complaints.”).

⁵³ Margot E. Kaminski et al., *Averting Robot Eyes*, 76 MD. L. REV. 983, 985–98 (2017); Kimiko de Freytas-Tamura, *The Bright-Eyed Talking Doll that Just Might Be a Spy*, N.Y. TIMES (Feb. 17, 2017), <https://www.nytimes.com/2017/02/17/technology/cayla-talking-doll-hackers.html> (reporting on new doll that records and reports the voices of children to its parent corporation).

⁵⁴ See Dario Floreano & Robert J. Wood, *Science, Technology and the Future of Small Autonomous Drones*, 521 NATURE 460, 460 (2015) (explaining that improved technological capabilities have allowed for the increasing use of miniature drones for civilian applications).

⁵⁵ THE CIRCLE (STX Films and EuropaCorp 2017).

⁵⁶ See, e.g., Jessica Gabel Cino, Opinion, *How Does Facial Recognition Technology Work?*, NEWSWEEK (Apr. 30, 2017, 5:00 AM), <http://www.newsweek.com/facial-recognition-facial-recognition-technology-technology-privacy-privacy-592117> (reporting on executive order that expands facial recognition systems in major U.S. airports to monitor people leaving the United States, in hopes of catching people who have overstayed their visas or are wanted in criminal investigations); Colin Lecher & Russell Brandom, *The FBI has Collected 430,000 Iris Scans in a So-Called ‘Pilot Program’*, VERGE (July 12, 2016, 8:00 AM), <https://www.theverge.com/2016/7/12/12148044/fbi-iris-pilot->

images.⁵⁷ One recent study showed that nearly fifty percent of all Americans' images are now contained in a facial recognition database being built from driver's licenses and other images.⁵⁸ Artificial intelligence is also being developed to allow us to identify emotions, as well as faces.⁵⁹ When we use our phones and other computers to communicate or create documents, we leave evidence on the devices themselves⁶⁰ and often also in the "cloud."⁶¹

ii. Identifying Our Physical Traces

The two best known and most used means for tracking our physical traces are fingerprints and DNA. For many years, fingerprints were thought

program-ngi-biometric-database-aclu-privacy-act (stating that one police department has collected iris data from at least 200,000 arrestees between 2013 and 2016).

⁵⁷ See, e.g., Kashmir Hill, *The Secretive Company That Might End Privacy as We Know It*, N.Y. TIMES (Jan. 18, 2020), <https://www.nytimes.com/2020/01/18/technology/clearview-privacy-facial-recognition.html?smid=nytcore-ios-share> (discussing new app, marketed to law enforcement, that has scraped over three billion images from millions of websites and social media). The FBI's Next Generation Identification program uses a broad array of tools including palm prints, irises, and facial recognition to provide what the Agency called "the world's largest and most efficient repository of biometric and criminal history information." *Next Generation Identification (NGI)*, FED. BUREAU OF INVESTIGATION, <https://www.fbi.gov/services/cjis/fingerprints-and-other-biometrics/ngi> (last visited June 12, 2018). In Great Britain, the police have equipped some of their vans with facial recognition software so that they can drive around town and search for purported criminals. Dell Cameron, *British Cops Make First Arrest Using Facial Recognition Surveillance Vans*, GIZMODO (June 6, 2017, 12:30 PM), <http://gizmodo.com/british-cops-make-first-arrest-using-facial-recognition-1795852963>. In China, police officers are equipped with facial recognition glasses, and cameras powered by artificial intelligence are placed all around the country in an effort to fight crime and catch suspects. Paul Mozur, *Inside China's Dystopian Dreams: A.I., Shame and Lots of Cameras*, N.Y. TIMES (July 8, 2018), <https://www.nytimes.com/2018/07/08/business/china-surveillance-technology.html>.

⁵⁸ Clare Garvie et al., *The Perpetual Line-Up: Unregulated Police Face Recognition in America*, GEO. L. CTR. ON PRIVACY & TECH. (Oct. 18, 2016), <https://www.perpetuallineup.org>.

⁵⁹ Tim Lewis, *AI Can Read Your Emotions. Should It?*, GUARDIAN (Aug. 17, 2019, 11:00 EDT), <https://www.theguardian.com/technology/2019/aug/17/emotion-ai-artificial-intelligence-mood-realeyes-amazon-facebook-emojient>; see also *60 Minutes, What's on the Horizon for A.I.?* (CBS television broadcast commercial June 23, 2017), https://www.cbs.com/shows/60_minutes/video/vgqb09XuRGuCVynSsk3ZYCRV8WA257PX/what-s-on-the-horizon-for-a-i-/.

⁶⁰ See, e.g., *In re Search of an Apple iPhone Seized During Execution of a Search Warrant on a Black Lexus IS300*, Cal. License Plate 35KGD203, No. ED 15-0451M, 2016 WL 618401, at *1 (C.D. Cal. Feb. 16, 2016) (ordering Apple to assist law enforcement in accessing the information on an iPhone seized when executing a search warrant on the San Bernardino shooter's vehicle); Clark D. Cunningham, *Apple and the American Revolution: Remembering Why We Have the Fourth Amendment*, 126 YALE L.J.F. 216, 216 (2016) (discussing the Department of Justice's attempts to access alleged evidence on phones).

⁶¹ Christopher Soghoian, *Caught in the Cloud: Privacy, Encryption, and Government Back Doors in the Web 2.0 Era*, 8 J. TELECOMM. & HIGH TECH. L. 359, 362-64 (2010) (describing "the cloud" and its capabilities); *iCloud: What is iCloud*, APPLE (June 20, 2019), https://support.apple.com/kb/PH2608?locale=en_US.

to provide a unique identifier,⁶² and law enforcement began to use them in the early 1900s.⁶³ As various law enforcement agencies have acquired banks of fingerprints, and as courts have accepted fingerprints as evidence,⁶⁴ the technique has become more and more valuable.⁶⁵ Our evolving fingerprint technology even allowed investigators to identify the remains of a body that had been buried in a potter's field forty-five years earlier.⁶⁶ While the tool is certainly not infallible,⁶⁷ it has undoubtedly provided us with a great deal of information.

Tracing DNA is far more powerful than identifying fingerprints. After scientists famously discovered its unique molecular structure,⁶⁸ U.S. law enforcement began to use DNA secreted in blood, hair, semen, or other substances to potentially identify persons who had perpetrated criminal or other acts.⁶⁹ One famous early use of DNA evidence was the O.J. Simpson murder trial in 1995, in which prosecutors sought to use blood stains to implicate O.J. as the killer of his ex-wife.⁷⁰ Today, law enforcement authorities are both augmenting their own DNA databases and also

⁶² See Jennifer L. Mnookin, *Fingerprint Evidence in an Age of DNA Profiling*, 67 BROOK. L. REV. 13, 13–31 (2001) (providing history of our reliance on fingerprint analysis and noting that author Mark Twain helped popularize the use of fingerprints as a law enforcement tool in his book *Pudd'nhead Wilson* (1893)); see also Michael J. Saks, *Merlin and Solomon: Lessons from the Law's Formative Encounters with Forensic Identification Science*, 49 HASTINGS L.J. 1069, 1100–06 (1998) (explaining why courts came to accept fingerprint identification so easily despite a lack of scientific validation); see generally FED. BUREAU OF INVESTIGATION, *THE SCIENCE OF FINGERPRINTS: CLASSIFICATION AND USES* (1985) (discussing the uses and classifications of fingerprints).

⁶³ Mnookin, *Fingerprint Evidence*, *supra* note 62, at 20.

⁶⁴ See generally Jennifer Mnookin, *The Validity of Latent Fingerprint Identification: Confessions of a Fingerprinting Moderate*, 7 L. PROBABILITY & RISK 127, 127–41 (2008) (contrasting courts' almost universal acceptance of the validity of fingerprint analysis with experts' wide-ranging skepticism as to the scientific validity of the tool).

⁶⁵ See, e.g., Jennifer Lynch, *FBI Combines Civil and Criminal Fingerprints into One Fully Searchable Database*, ELECTRONIC FRONTIER FOUND. (Sept. 18, 2015), <https://www EFF.ORG/deep links/2015/09/little-fanfare-fbi-ramps-biometrics-programs-yet-again-part-1> (describing the FBI's new policy of combining civil and criminal fingerprints into one fully searchable database).

⁶⁶ Michael Wilson, *Solved: The 47-Year Mystery of a Murder Victim's Many Identities*, N.Y. TIMES (June 7, 2017), <https://www.nytimes.com/2017/06/07/nyregion/unsolved-harlem-murder.html>.

⁶⁷ See, e.g., Simon A. Cole, *More Than Zero: Accounting for Error in Latent Fingerprint Identification*, 95 J. CRIM. L. & CRIMINOLOGY 985, 990–91 (2005) (discussing fallibility and error rates in fingerprinting); Mnookin, *The Validity of Latent Fingerprint Identification*, *supra* note 64, at 141 (arguing that fingerprint science has not been sufficiently validated to be admissible in court); see also *infra* text accompanying notes 178–81 (discussing how human mental frailties can lead to problems with fingerprint evidence).

⁶⁸ James D. Watson & Francis H. Crick, *Molecular Structure of Nucleic Acids: A Structure for Deoxyribose Nucleic Acid*, 171 NATURE 737, 737–38 (1953).

⁶⁹ JOHN M. BUTLER, *FUNDAMENTALS OF FORENSIC DNA TYPING* 48 (2010); SHEILA JASANOFF, *SCIENCE AT THE BAR: LAW, SCIENCE, AND TECHNOLOGY IN AMERICA* 55 (1995).

⁷⁰ See William C. Thompson, *DNA Evidence in the O.J. Simpson Trial*, 67 U. COLO. L. REV. 827, 827 (1996) (arguing that a jury could reasonably have concluded that the DNA evidence in the Simpson case deserved little or no weight).

increasingly looking to privately maintained databases.⁷¹ Further, DNA tools are being refined so that scientists can potentially identify persons using DNA identifiers provided by their relatives, as well as by themselves. As a result, in several widely-publicized cases, police have used ancestry databases to track down purported criminals, including the alleged Golden State Killer.⁷² Additionally, police are now implementing a “DNA Magic Box” that will allow them to use the technology more quickly and cheaply.⁷³ While, as with fingerprints, the DNA identification tool is not infallible,⁷⁴ clearly it has led to major changes in our justice system. DNA is regularly being used in criminal trials,⁷⁵ heavily featured on crime drama shows such as CSI,⁷⁶ may be used in civil contexts,⁷⁷ and is even being employed to identify whose dog littered its poop in a common area.⁷⁸ DNA has also sometimes helped liberate those who have been wrongly convicted.⁷⁹

⁷¹ See ERIN E. MURPHY, *INSIDE THE CELL: THE DARK SIDE OF FORENSIC DNA* 15–16 (2015) for a discussion of the national DNA database first established in 1998. See also Erin Murphy, *DNA in the Criminal Justice System: A Congressional Research Service Report* (*From the Future)*, 64 UCLA L. REV. DISCOURSE 340, 343 (2016) (observing that, as of 2016, the CODIS database contained roughly fifteen million known person files and seven hundred thousand forensic profiles, drawing on samples from “convicted persons, arrested persons, unidentified remains, missing persons, and relatives of missing persons”).

⁷² Heather Murphy, *She Helped Crack the Golden State Killer Case. Here’s What She’s Going to Do Next.*, N.Y. TIMES (Aug. 29, 2018), <https://www.nytimes.com/2018/08/29/science/barbara-rae-venter-gsk.html>; see also Heather Murphy, *Genealogy Sites Have Helped Identify Suspects. Now They’ve Helped Convict One*, N.Y. TIMES (July 1, 2019), <https://www.nytimes.com/2019/07/01/us/dna-genetic-genealogy-trial.html> (describing how genetic genealogy has “redefined the cutting edge of forensic science”).

⁷³ Heather Murphy, *Coming Soon to a Police Station Near You: The DNA ‘Magic Box’*, N.Y. TIMES (Jan. 21, 2019), <https://www.nytimes.com/2019/01/21/science/dna-crime-gene-technology.html>.

⁷⁴ See MURPHY, *INSIDE THE CELL*, *supra* note 71, at 3–5.

⁷⁵ *Id.* at 288–95.

⁷⁶ *CSI: Crime Scene Investigation* (CBS television broadcast 2000–2015).

⁷⁷ DNA could potentially be used to establish paternity, Jane C. Murphy, *Legal Images of Fatherhood: Welfare Reform, Child Support Enforcement, and Fatherless Children*, 81 NOTRE DAME L. REV. 325, 365–70 (2005), to identify the alleged wrongdoer in an accident, *DNA Evidence in a Personal Injury or Accident Claim*, MEINHART, SMITH, & MANNING PLLC, <https://www.bluegrassjustice.com/personal-injury/dna-evidence/> (last visited Nov. 20, 2019), or to prove cellular damage due to chemical exposure, Mark Hansen, *DNA Poised to Show its Civil Side*, A.B.A. J. (Mar. 1, 2008), http://www.abajournal.com/magazine/article/dna_poised_to_show_its_civil_side.

⁷⁸ Some apartment buildings have required their dog owners to provide DNA samples from their dog, so that when poop is found on the premises it can be linked to the proper dog and appropriate measures can be taken. Danny Lewis, *Dog Owners Beware, DNA in Dog Poop Could Be Used to Track You Down*, SMITHSONIAN (Mar. 30, 2016), <http://www.smithsonianmag.com/smart-news/dog-owners-beware-dna-dog-poop-could-used-track-you-down-180958596/>.

⁷⁹ See BARRY SCHECK ET AL., *ACTUAL INNOCENCE: WHEN JUSTICE GOES WRONG AND HOW TO MAKE IT RIGHT* xv–xxiii, 359 (2003). While some might assume that law enforcement would jump at the opportunity to use the most recent scientific tools, instead it seems that many police and prosecutors are often resistant to the new approaches. DAVID A. HARRIS, *FAILED EVIDENCE: WHY LAW ENFORCEMENT RESISTS SCIENCE* 2 (2012) (“With the exception of DNA (and then, only sometimes), most of our police and prosecutorial agencies *do not* welcome the findings of science; they *do not* rush to incorporate the latest scientific advances into their work.”).

We leave traces not only with our fingerprints and our DNA, but also in other ways that scientists are beginning to track. For example, the particular combination of bacteria hosted by each of us is fairly unique, and we leave bacterial traces as we breathe, excrete, lose hairs, and so on.⁸⁰ Thus, even when rapists use gloves, masks, and condoms to protect against fingerprint and DNA identification, they can potentially be identified through the bacteria in the pubic hair they leave behind.⁸¹ Microbes left on keyboards, phones, or shoes could also be used to identify suspects who did not leave DNA or fingerprint traces.⁸² Further, scientists are developing the ability to track our medical conditions through our sweat.⁸³ Presumably, scientists will continue to develop even more sophisticated means to follow our traces.

iii. Tracking Our Movement

Today's technology also allows us to track movement directly, through technology installed in our devices or even potentially our bodies. For example, when we make calls on our mobile phones, the signals bounce between cell towers, thereby allowing technicians to trace the source of the call.⁸⁴ Phones can also be tracked directly through many applications.⁸⁵ It appears that some commercial companies⁸⁶ and law enforcement⁸⁷ are

⁸⁰ Jarrad T. Hampton-Marcell et al., *The Human Microbiome: An Emerging Tool in Forensics*, MICROBIAL BIOTECHNOLOGY (Feb. 27, 2017), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5328825/>; Kai Kupferschmidt, *How Your Microbiome Can Put You at the Scene of the Crime*, SCIENCE (Mar. 8, 2016, 9:45 AM), <http://www.sciencemag.org/news/2016/03/how-your-microbiome-can-put-you-scene-crime>.

⁸¹ Dalmeet Singh Chawla, *Bacteria on Pubic Hair Could Be Used to Identify Rapists*, SCIENCE (Dec. 15, 2014, 8:00 PM), <http://www.sciencemag.org/news/2014/12/bacteria-pubic-hair-could-be-used-identify-rapists>.

⁸² Ed Yong, *Can the Microbes You Leave Behind Be Used to Identify You?*, NAT'L GEOGRAPHIC (May 11, 2015), <https://www.nationalgeographic.com/science/phenomena/2015/05/11/can-the-microbes-you-leave-behind-be-used-to-identify-you/>.

⁸³ Apoorva Mandavilli, *Your Sweat Will See You Now*, N.Y. TIMES (Jan. 18, 2019), <https://www.nytimes.com/2019/01/18/health/wearable-tech-sweat.html>.

⁸⁴ Season 1 of the podcast *Serial* examines how this technology was used to convict Adnan Syed of the murder of his former girlfriend. *The Alibi*, SERIAL (Oct. 3, 2014), <https://serialpodcast.org/season-one>.

⁸⁵ The iPhone, for example, allows persons to voluntarily provide others with access to their location data. *Locations Services & Privacy*, APPLE (Mar. 25, 2019), <https://support.apple.com/en-us/HT207056>; *Track and Find Your Missing Apple Device*, APPLE, <https://support.apple.com/explore/find-my-iphone-ipad-mac-watch> (last visited Aug. 29, 2019). Android phones can also be tracked. Cara McGoogan, *Millions of Android Phones Could Be Tracked with Ultrasonic Spying Tool*, TELEGRAPH (May 8, 2017, 11:36 AM), <http://www.telegraph.co.uk/technology/2017/05/08/millions-android-phones-could-tracked-ultrasonic-spying-tool/>.

⁸⁶ See Chirag Kulkarni, *15 Ways Geolocation Is Totally Changing Marketing*, FORTUNE (Feb. 6, 2017), <http://fortune.com/2017/02/06/geolocation-marketing/> (showing how companies use targeted advertising to send customers advertisements based on their location).

⁸⁷ Andy Greenberg, *How the CIA Can Hack Your Phone, PC, and TV (Says Wikileaks)*, WIRED (Mar. 7, 2017, 4:03 PM), <https://www.wired.com/2017/03/cia-can-hack-phone-pc-tv-says-wikileaks/>; Brad Heath, *Police Secretly Track Cellphones to Solve Routine Crimes*, USA TODAY (Aug. 24, 2015,

already using such tracking tools, and it seems likely that this use will increase exponentially in the future, though as in other contexts, courts will have to wrestle with evidentiary and privacy issues.⁸⁸

Phones are not the only method of tracking our whereabouts directly. For example, in one case a man used his “Fitbit” data to support his alibi in a murder investigation,⁸⁹ and a woman’s “Fitbit” data was used to prove her husband killed her.⁹⁰ In addition, police can install tracking tools directly onto cars,⁹¹ although that is beginning to look downright old-fashioned. In the future, we can expect that people may even have tracking or identification devices installed directly into their bodies, as we already do for our pets.⁹² A Wisconsin tech company offered to install chips in employees so they could easily enter the building and pay for cafeteria food with a wave of the hand, and a majority of the employees voluntarily got the chip.⁹³

2. *The Technology of What We Are or Were Thinking*

The technology discussed above is amazing, but pales in comparison to potentially using technology to get into peoples’ brains. Imagine the implications for dispute resolution if we can figure out what people are thinking or remembering, or whether they were under the influence of drugs or alcohol.⁹⁴ First, getting into peoples’ memories could give us an indirect

7:51 AM), <https://www.usatoday.com/story/news/2015/08/23/baltimore-police-stingray-cell-surveillance/31994181/>.

⁸⁸ In *Carpenter v. United States*, a five-to-four Supreme Court recently held that a warrant is needed to access cell phone site location information. 138 S. Ct. 2206, 2221 (2018).

⁸⁹ Kate Briquet, *My Fitbit Proves I Didn’t Kill Her*, DAILY BEAST (June 6, 2017, 8:50 AM), <http://www.thedailybeast.com/my-fitbit-proves-i-didnt-kill-her>.

⁹⁰ Kevin Maney, *Busted by Your Fitbit: How Smart Devices Can Solve Crimes*, NEWSWEEK (May 13, 2017, 10:00 AM), <http://www.newsweek.com/2017/05/26/fitbit-smart-technology-smart-devices-crime-true-crime-amazon-echo-google-home-608410.html> (giving examples of how fitness technology that tracks movements can be used to solve crimes and confirm or disprove alibis).

⁹¹ *United States v. Jones*, 565 U.S. 400, 404 (2012) (holding that police installation of a tracking device on a car is a “search” under the Fourth Amendment, thereby requiring police to obtain a warrant prior to installation).

⁹² *Microchipping of Animals FAQ*, AVMA, <https://www.avma.org/KB/Resources/FAQs/Pages/Microchipping-of-animals-FAQ.aspx> (last visited Aug. 29, 2019).

⁹³ Maggie Astor, *Microchip Implants for Employees? One Company Says Yes*, N.Y. TIMES (July 25, 2017), <https://www.nytimes.com/2017/07/25/technology/microchips-wisconsin-company-employees.html>.

⁹⁴ See, e.g., Nita A. Farahany, *Searching Secrets*, 160 U. PA. L. REV. 1239, 1274–88 (2012) (discussing how neuroscience and other means can be used to identify an unknown person and to determine whether that person was under the influence of drugs or alcohol). Of course, the mere fact that brain science can yield certain technical information does not mean that the use would be permitted by law, including the U.S. Constitution. See Nita A. Farahany, *Incriminating Thoughts*, 64 STAN. L. REV. 351, 400–07 (2012) (discussing how the use of such technical information could create Fourth and Fifth Amendment issues).

way to find out what actually happened.⁹⁵ Perhaps this testing could even reveal information that the witness or perpetrator does not consciously remember or does not wish to reveal. Second, perhaps we could uncover information regarding state of mind and intent, such as whether a person acted *knowingly*, *intentionally*,⁹⁶ *reasonably*,⁹⁷ or *maliciously*,⁹⁸ or the extent to which a person suffered pain.⁹⁹ While we cannot yet insert electrodes or use other devices to learn exactly what is in someone's brain, we are getting closer to that point, for better or for worse.

i. Technology That Indirectly Measures What People Are Thinking

Invented in 1921 by John Augustus Larson,¹⁰⁰ polygraph machines do not tap directly into the subject's brain, but rather measure physiological responses such as blood pressure, pulse, and respiration on the theory that giving false answers will cause the needle to move on these measures.¹⁰¹ The accuracy of the polygraph has been hotly contested, as many contend that nervous but honest subjects may incorrectly be found to be lying¹⁰² and that

⁹⁵ Of course, to the extent we will be trying to use technology to access information from human brains, we will need to deal with what computer programmers call the issue of "garbage in, garbage out." See *Garbage In, Garbage Out*, FREE DICTIONARY, <https://idioms.thefreedictionary.com/garbage+in+%2C+garbage+out> (last visited Aug. 29, 2019). If observer O thought they saw A kill B, they may remember A killed B. Yet, while the memory may be clear, O's initial perception may have been erroneous. And, even if O's initial perception was accurate, maybe O's memory was not perfect or has become tainted.

⁹⁶ On the criminal side, we generally require evidence of intent of crimes such as murder or theft or battery. MODEL PENAL CODE § 2.02 (AM. LAW INST. 1985). Civilly, intent can be relevant to prove discrimination or fraud. See, e.g., *Washington v. Davis*, 426 U.S. 229, 239 (1976) (holding that discrimination claims brought under the Equal Protection Clause require a showing of intent).

⁹⁷ Betsy J. Grey, *Neuroscience and Emotional Harm in Tort Law: Rethinking the American Approach to Free-Standing Emotional Distress Claims*, in *LAW AND NEUROSCIENCE: CURRENT LEGAL ISSUES* 2010, at 203, 228 (Michael Freeman ed., 2011). But see Richard Restak, *The Fiction of the 'Reasonable Man'*, WASH. POST (May 17, 1987), https://www.washingtonpost.com/archive/opinions/1987/05/17/the-law-the-fiction-of-the-reasonable-man/15dea8f3-521a-48d0-aba8-9e361774450e/?utm_term=.204d92d76957 (discussing that due to the nature of our neurological structures, the "reasonableness" standard is unrealistic).

⁹⁸ "Punitive damages may be awarded for conduct that is outrageous, because of the defendant's evil motive or his reckless indifference to the rights of others." RESTATEMENT (SECOND) OF TORTS § 908(2) (AM. LAW INST. 1979).

⁹⁹ See, e.g., Amanda C. Pustilnik, *Pain as Fact and Heuristic: How Pain Neuroimaging Illuminates Moral Dimensions of Law*, 97 CORNELL L. REV. 801, 811 (2012).

¹⁰⁰ NATHAN J. GORDON, *ESSENTIALS OF POLYGRAPH AND POLYGRAPH TESTING* 15 (2017).

¹⁰¹ *Id.*

¹⁰² Scott Lilienfeld, *The Polygraph Test Strikes – and Strikes Out – Again*, PSYCHOL. TODAY (July 21, 2009), <https://www.psychologytoday.com/us/blog/the-skeptical-psychologist/200907/the-polygraph-test-strikes-and-strikes-out-again>.

cool liars can fool the test.¹⁰³ As a result, polygraph results have been heavily critiqued and are often not admissible in court.¹⁰⁴

Efforts are under way to try to improve on the polygraph using other tools that would also, indirectly, try to determine what someone is thinking. For example, one company has been developing software intended to detect lies by tracing eye movements.¹⁰⁵ Other companies are exploring whether voice recognition,¹⁰⁶ analysis of facial expressions,¹⁰⁷ or measurements of body twitches¹⁰⁸ may provide better insight into truthfulness. Some suggest we are even getting to the point where robots can be used to measure subjects' truthfulness.¹⁰⁹ While it seems unlikely any of these tools will give completely reliable insights into subjects' honesty, at least they give us a sense where the science is heading.

ii. Tap Directly into the Brain???

Scientists are also beginning to develop tools to try to tap directly into someone's brain, to see what the person is thinking or what they

¹⁰³ See, e.g., DOUG WILLIAMS, *HOW TO STING THE POLYGRAPH 2* (2014) (ebook), https://ia600207.us.archive.org/29/items/WilliamsDougHowToStingThePolygraph/Williams%2C_Doug_-_How_to_Sting_the_Polygraph.pdf (discussing how to "beat[]" a polygraph test). The author Doug Williams, a former police officer and polygraph examiner, served two years in jail for obstruction of justice and mail fraud connected to his business of training people how to pass polygraph exams. See Christina Sterbenz, *This Ex-Cop Thinks Lie-Detector Tests Are So Inaccurate He's Facing 100 Years in Prison for Starting a Website That Taught People How to Cheat Them*, BUS. INSIDER (May 18, 2015), <http://www.businessinsider.com/the-crazy-story-of-an-ex-cop-who-ran-a-website-that-taught-people-how-to-cheat-polygraphs-2015-5>; see also Mr. Lie Detector, THIS AM. LIFE (June 9, 2017), <https://www.thisamericanlife.org/radio-archives/episode/618/mr-lie-detector>.

¹⁰⁴ *United States v. Scheffer*, 523 U.S. 303, 317 (1998) (finding that excluding the evidentiary admission of polygraph results did not violate the defendant's constitutional rights); Michael Stockdale & Don Grubin, *The Admissibility of Polygraph Evidence in English Criminal Proceedings*, 76 J. CRIM. L. 232, 232 (2012) (discussing that while English and Commonwealth authority tend to find polygraph evidence is inadmissible, the issue has not yet been decided by the English Court of Appeal).

¹⁰⁵ Univ. of Utah, *'You Can't Hide Your Lyin' Eyes': Eye-Tracking Lie-Detection*, PHYS.ORG (July 12, 2010), <https://phys.org/news/2010-07-lyin-eyes-eye-tracking-lie-detection.html>.

¹⁰⁶ Susan Miller, *When Everybody Lies: Voice-Stress Analysis Tackles Lie Detection*, GCN (Mar. 18, 2014), <https://gcn.com/articles/2014/03/18/voice-risk-analysis.aspx> (discussing increasing use of Computer Voice Stress Analysis tests including in criminal investigations).

¹⁰⁷ Richard Gray, *The App That Knows if You're Lying: Online 'Polygraph' Uses Artificial Intelligence to Study Your Face for Subtle Signs You're Being Deceitful*, DAILY MAIL (Jan. 12, 2016), <http://www.dailymail.co.uk/sciencetech/article-3395651/The-robot-knows-lying-Polygraph-powered-artificial-intelligence-studies-face-voice-subtle-signs-deceitful.html>.

¹⁰⁸ Ewen MacAskill, *British and Dutch Researchers Develop New Form of Lie-Detector Test*, GUARDIAN (Jan. 4, 2015 12:16 PM), <https://www.theguardian.com/science/2015/jan/04/british-dutch-researchers-new-form-lie-detector-test-polygraph>.

¹⁰⁹ See June Javelosa, *New Lie-Detecting Robot Security Agent Could Help Secure Borders*, FUTURISM (Jan. 6, 2017), <https://futurism.com/new-lie-detecting-robot-security-agent-could-help-secure-borders/> (providing information on the Automated Virtual Agent for Truth Assessments in Real Time (AVATAR) and its ability to identify signs of lying and discomfort in travelers at borders using eye-detection software and motion and pressure sensors).

remember.¹¹⁰ The best known such tool is currently the fMRI—functional magnetic resonance imaging—a tool that “measures small and variable changes in the ratio of oxygenated to deoxygenated blood in the brain when a particular task is performed or stimulus presented.”¹¹¹ While the fMRI does not directly reveal thoughts or memories, some have suggested that it can effectively be used to measure whether someone is telling the truth. For example, a person can be shown pictures or asked questions while electrodes are attached to their head to measure reactions. By looking at which areas of the brain “light up” due to a higher presence of oxygenated blood, scientists may hypothesize whether the subject was previously familiar with a certain picture or words and whether or not the subject is lying when they make certain statements.¹¹² Moreover, some researchers are even trying to compile what one commentator has called a “dictionary” of sorts for individual subjects, using fMRI technology to determine what the subject was thinking about at the time they were tested.¹¹³ Advocates of this new technology contend that it is more reliable than polygraphs because brain waves and cerebral blood flow are arguably less subject to control than blood pressure and heart rate.¹¹⁴ While both courts and scientists have generally agreed that the probative value of the fMRI is not yet sufficient to allow its use in court,¹¹⁵ one can foresee a day when such technology might contribute to dispute resolution.

¹¹⁰ See generally *The MacArthur Foundation Research Network on Law and Neuroscience*, VAND. U., www.lawneuro.org (last visited Nov. 20, 2019), a website created by The MacArthur Foundation Research Network on Law and Neuroscience.

¹¹¹ Anthony D. Wagner et al., *fMRI and Lie Detection: A Knowledge Brief of the MacArthur Foundation Research Network on Law and Neuroscience* 1 (Vanderbilt Law Research Paper No. 17-10, 2016), <https://ssrn.com/abstract=2881586>. See generally Stacey Tovino, *Functional Neuroimaging and the Law: Trends and Directions for Future Scholarship*, 7 AM. J. BIOETHICS 44, 44–56 (2007) (discussing the use of neuroimaging and the law).

¹¹² Wagner et al., *supra* note 111, at 1.

¹¹³ For example, fMRI studies have been done to try to determine which of several images the person was thinking about, or which of several videos they had watched. MARC JONATHAN BLITZ, *SEARCHING MINDS BY SCANNING BRAINS: NEUROSCIENCE TECHNOLOGY AND CONSTITUTIONAL PRIVACY PROTECTION* 56–57 (2017).

¹¹⁴ Mark Peplow, *Brain Imaging Could Spot Liars*, NATURE (Nov. 29, 2004), <https://www.nature.com/news/2004/041129/full/news041129-1.html>.

¹¹⁵ For example, in *United States v. Semrau*, the Sixth Circuit Court of Appeals held that the district court did not err in failing to admit fMRI expert testimony the defense sought to introduce to prove the defendant was telling the truth. 693 F.3d 510, 516 (6th Cir. 2012); see also Michael Laris, *Debate on Brain Scans as Lie Detectors Highlighted in Maryland Murder Trial*, WASH. POST (Aug. 26, 2012), https://www.washingtonpost.com/local/crime/debate-on-brain-scans-as-lie-detectors-highlighted-in-maryland-murder-trial/2012/08/26/aba3d7d8-ed84-11e1-9ddc-340d5efb1e9c_story.html (discussing murder case, *State v. Smith*, in which a Maryland judge refused to admit fMRI evidence defense counsel claimed should prove their client was being truthful); Alexis Madrigal, *Brain Scan Evidence Rejected by Brooklyn Court*, WIRED (May 5, 2010, 5:08 PM), <https://www.wired.com/2010/05/fmri-in-court-update/> (explaining the court’s exclusion of fMRI evidence in an employer-retaliation case).

Another form of brain technology, sometimes referred to as “brain fingerprinting,”¹¹⁶ may be even more promising. This technique studies brain waves emitted when persons are exposed to certain familiar stimuli, such as images that would be known only to a guilty person.¹¹⁷ Thus, rather than directly testing whether a person is telling the truth, it aims to determine whether the subject is familiar with certain information that would be known only to the perpetrator.¹¹⁸ For example, in the Steven Avery case, made famous in the *Making a Murderer* television documentary,¹¹⁹ Dr. Larry Farwell opined based on this test that Mr. Avery did not know specific information regarding where the victim was killed.¹²⁰ Dr. Farwell claims that the technology has successfully been used both to convict a serial killer¹²¹ and to free a man who had been wrongfully convicted.¹²² However, as with the fMRI, “brain fingerprinting” is not yet generally accepted by either courts or researchers.¹²³

Other brain-reading technology exists as well. A tool called functional near infrared imaging (fNIR) produces maps of brain activity similar to those produced by the fMRI, but without having to place the subject in a tubular

¹¹⁶ See generally Larry Farwell, *Brain Fingerprinting: Detection of Concealed Information*, in WILEY ENCYCLOPEDIA OF FORENSIC SCIENCE (A. Jamieson & A.A. Moenssens eds., 2014).

¹¹⁷ The technique, also known as a “concealed information” or “guilty knowledge” test, MARC JONATHAN BLITZ, *SEARCHING MINDS BY SCANNING BRAINS: NEUROSCIENCE TECHNOLOGY AND CONSTITUTIONAL PRIVACY PROTECTION* 48–49 (2017), relies on electroencephalography (EEG) to measure subjects’ responses using a P300—a particular measurable brainwave. See Alexandra J. Roberts, *Everything New is Old Again: Brain Fingerprinting and Evidentiary Analogy*, 9 YALE J.L. & TECH. 234, 260–64 (2007) (describing author’s personal experience being tested by Dr. Farwell). Dr. Farwell’s later research shows that the P300 is a piece of a larger response, which he labeled MERMER—Memory and Encoding Related Multifaceted Electroencephalography. *Id.* at 260.

¹¹⁸ Dr. Larry Farwell claims to have invented this technology. See Larry Farwell, *Farwell Brain Fingerprinting: A New Paradigm in Criminal Justice and Counterterrorism*, FARWELL BRAIN FINGERPRINTING, <https://larryfarwell.com/brain-fingerprinting-executive-summary-dr-larry-farwell-dr-lawrence-farwell.html> (last visited July 28, 2018). But others have also been exploring the use of P300 brainwaves to provide an alternative to the polygraph. Virginia Hughes, *The Other Polygraph*, NAT’L GEOGRAPHIC (Sept. 30, 2014), <http://phenomena.nationalgeographic.com/2014/09/30/the-other-polygraph/>.

¹¹⁹ *Making a Murderer* (Netflix 2015).

¹²⁰ Notice of Motion & Motion for Post-Conviction Relief Pursuant to Wis. Stat. 974.06 & 805.15 at 144–55, *Wisconsin v. Avery*, No. 05-CF-1381 (Wis. Ct. App. June 17, 2017).

¹²¹ See, e.g., Lawrence A. Farwell et al., *Brain Fingerprinting Field Studies Comparing P300-MERMER and P300 Brainwave Responses in the Detection of Concealed Information*, 7 COGNITIVE NEURODYNAMICS 263, 263 (2013); see also Roberts, *supra* note 117, at 257–64.

¹²² For a detailed discussion of the case, see Roberts, *supra* note 117, at 264–65 (explaining that after testing confirmed defendant’s version of events, the primary prosecution witness recanted his testimony).

¹²³ See, e.g., Lyn M. Gaudet, Note, *Brain Fingerprinting, Scientific Evidence, and Daubert: A Cautionary Lesson from India*, 51 JURIMETRICS J. 293, 306 (2011) (commenting on the fact that fMRIs are not generally accepted by courts or researchers).

scanner.¹²⁴ Also, electroencephalography (EEG) technology has been used for many years to measure rhythms of electrical brain activity, and perhaps may advance to yield more specific information.¹²⁵ Additional potential tools include Positron Emission Tomography and Single Photon Emission Computer Tomography scanning, which also measure blood flow in the brain.¹²⁶

In short, while we are not yet able to tap directly into brains to pull out memories or intentions, it does seem clear that we are on this road and that neurologists will increasingly be called upon to help resolve legal disputes. We can also be confident that many technical,¹²⁷ legal,¹²⁸ and philosophical¹²⁹ issues will be raised as to the evidentiary use of neurological findings. For the purposes of this Article, however, the most significant issues are the extent to which we can solve legal conundrums by obtaining information from technological sources, the limits of the technology, and how these technological advances should affect our dispute resolution system. We now turn to these questions.

¹²⁴ BLITZ, *supra* note 117, at 4 (citing Hasan Ayaz et al., *Using Maze Suite and Functional Near Infrared Spectroscopy to Study Learning in Spatial Navigation*, 56 J. VISUALIZED EXPERIMENTS 1, 1 (2011)).

¹²⁵ *Id.* at 4–5, 45–55.

¹²⁶ *Id.* at 54–55; *see also* MICHAEL S. PARDO & DENNIS PATTERSON, *MINDS, BRAINS, AND LAW: THE CONCEPTUAL FOUNDATIONS OF LAW AND NEUROSCIENCE* xxii–xxv (2013) (briefly explaining MRI, fMRI, EEG, and other neuroscience technology).

¹²⁷ *See, e.g.*, Daniel D. Langleben & Jane Campbell Moriarty, *Using Brain Imaging for Lie Detection: Where Science, Law and Policy Collide*, 19 PSYCHOL. PUB. POL’Y & L. 222, 222 (2013) (discussing how science needs to advance to support reliability of fMRI results); Frederick Schauer, *Can Bad Science be Good Evidence? Neuroscience, Lie Detection and Beyond*, 95 CORNELL L. REV. 1191, 1192 (2010) (suggesting that scientific results that do not meet scientists’ criteria for reliability may nonetheless be appropriate to admit at trial in certain situations).

¹²⁸ Regarding potential constitutional issues, *see, e.g.*, BLITZ, *supra* note 117, at 59–60 (discussing neuroimaging and the Fifth Amendment); Dov Fox, *Will Memory Detection Technology Transform Criminal Justice in the U.S.? Brain Imaging and the Bill of Rights*, 8 AM. J. BIOETHICS 1, 1 (2008) (examining Fourth and Fifth Amendment implications of admitting neuroscience evidence); Francis X. Shen, *Neuroscience, Mental Privacy, and the Law*, 36 HARV. J.L. & PUB. POL’Y 653, 692–707 (2013) (same).

¹²⁹ *See generally* 3 MORAL PSYCHOLOGY: THE NEUROSCIENCE OF MORALITY: EMOTION, DISEASE, AND DEVELOPMENT (Walter Sinnott-Armstrong ed., 2008) (discussing topics including “Internalism and the Evidence form Pathology”); PARDO & PATTERSON, *supra* note 126, at 179–207 (discussing implications of neuroscience for theories of criminal punishment); *see also* Jeffrey Rosen, *The Brain on the Stand*, N.Y. TIMES MAG. (Mar. 11, 2007), <https://www.nytimes.com/2007/03/11/magazine/11Neurolaw.t.html> (discussing the philosophy behind using neuroscience in the American legal system).

II. NOT SO QUICK—OUR NEW TECHNOLOGY WILL NOT NECESSARILY BRING US TRUTH OR JUSTICE

A. *New Technology Will Not Bring Us Indisputable Truth*

1. *Challenges to Recording and Presenting the Truth*

The science outlined above is amazing, but it will never deliver an indisputable truth, even if such truth exists. First, as a matter of logistics, it is difficult to imagine a world in which our technology will be so ever-present that it delivers information on all issues. Even if we were to have cameras virtually everywhere; collect everyone's fingerprints, retinal scans, and DNA; track everyone's phones and computers; and tap into everyone's brain, some event might be missed or incorrectly recorded.

Second, even to the extent that technology records an event or evaluates a brain, it will not resolve all issues.¹³⁰ In fact, in 2009 the National Academy of Science published a study showing that forensic sciences, for the most part, were not reliable.¹³¹ The study found that while DNA analyses could be quite effective, other popular tests including fingerprints, hair, and bullets often were not valid.¹³² One fundamental problem is that despite popular belief, even fingerprints and retinal scans have not been proven to be unique, much less bullet traces or footprints. As several commentators have suggested, excepting DNA, "[a]lthough individualization is the centerpiece of numerous forensic science subfields, . . . no theoretical or empirical basis for individualization exists, and none is likely to come into being in the foreseeable future."¹³³ Further, although analysts have found that DNA

¹³⁰ See, e.g., Paul C. Giannelli, *Forensic Science: Daubert's Failure*, 68 CASE W. RES. L. REV. 869, 869 (2018) (questioning courts' ability to figure out which technology works and suggesting the use of an independent commission to aid courts in this endeavor); Jonathan J. Koehler, *How Trial Judges Should Think About Forensic Science Evidence*, 102 JUDICATURE 28, 36 (2018) (urging that there are compelling reasons to be concerned about the quality of many categories of forensic evidence and that courts are failing to adequately evaluate and deal with these problems).

¹³¹ COMM. ON IDENTIFYING THE NEEDS OF THE FORENSIC SCI. CMTY., NAT'L RESEARCH COUNCIL, STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD 87 (2009); see also EXEC. OFFICE OF THE PRESIDENT, PRESIDENT'S COUNCIL OF ADVISORS ON SCI. & TECH., FORENSIC SCIENCE IN CRIMINAL COURTS: ENSURING SCIENTIFIC VALIDITY OF FEATURE-COMPARISON METHODS 142 (2016) (offering trial judges guidance on how to determine the scientific reliability of proffered forensic evidence).

¹³² EXEC. OFFICE OF THE PRESIDENT, PRESIDENT'S COUNCIL OF ADVISORS ON SCI. & TECH., *supra* note 131, at 67–123. Indeed, the 2009 National Academy of Science Report leads one to question whether these familiar types of evidence comply with the evidentiary standards set out by the Supreme Court in *Daubert v. Merrell Dow Pharmaceuticals, Inc.* 509 U.S. 579 (1993) (requiring judges to determine whether expert evidence is sufficiently reliable to be admissible).

¹³³ Saks & Faigman, *Failed Forensics*, *supra* note 37, at 154–56. We have also seen that some of our technology may be more effective at identifying white men than women or members of other racial or ethnic groups. See, e.g., Joy Buolamwini, *When the Robot Doesn't See Dark Skin*, N.Y. TIMES (June 21, 2018), <https://www.nytimes.com/2018/06/21/opinion/facial-analysis-technology-bias.html> (describing gender and racial bias demonstrated in tests of facial analysis technology); Steve Lohr, *Facial*

forensics has the potential to be much more accurate than the other methods,¹³⁴ it is also clear that mistakes can be made in DNA testing thereby leading to serious errors.¹³⁵ At most, DNA can deliver results within certain probabilistic ranges, but false negatives and false positives are always possible.¹³⁶ Moreover, one recent study even showed that a person's DNA could be changed by giving that person a bone marrow transplant.¹³⁷

Third, evidence can be faked, whether by prosecutors, investigators, or other parties.¹³⁸ DNA or bacteria can be planted¹³⁹ or improperly analyzed,¹⁴⁰ videos, audio, and photos can be altered,¹⁴¹ and presumably even brain scans

Recognition is Accurate, if You're a White Guy, N.Y. TIMES (Feb. 9, 2018), <https://www.nytimes.com/2018/02/09/technology/facial-recognition-race-artificial-intelligence.html> (noting problem Google faced in 2015 when its image-recognition photo app labeled African Americans as gorillas).

¹³⁴ E.g., NAS REPORT, *supra* note 37, at 47.

¹³⁵ The National Research Council has twice done in-depth studies on DNA testing and laboratory procedures, resulting in a series of recommendations to put in place protocols and procedures to ensure that the science is used properly. See Keith A. Findley, *Innocents at Risk: Adversary Imbalance, Forensic Science, and the Search for Truth*, 38 SETON HALL L. REV. 893, 965–66 (2008) (discussing research of the National Research Council); see also Paul C. Giannelli, *Wrongful Convictions and Forensic Science: The Need to Regulate Crime Labs*, 86 N.C. L. REV. 163, 187–91, 208–20 (2007) (discussing serious lapses in Houston DNA lab while also generally noting that DNA can be far more reliable than other forms of forensic science and is now often effectively regulated).

¹³⁶ See, e.g., Marina Medvin, *Framed by Your Own Cells: How DNA Evidence Imprisons the Innocent*, FORBES (Sept. 20, 2018), <https://www.forbes.com/sites/marinamedvin/2018/09/20/framed-by-your-own-cells-how-dna-evidence-imprisons-the-innocent/#582b985a4b86> (explaining how DNA evidence can be used against innocent people).

¹³⁷ Heather Murphy, *When a DNA Test Says You're a Younger Man, Who Lives 5,000 Miles Away*, N.Y. TIMES (Dec. 7, 2019), <https://www.nytimes.com/2019/12/07/us/dna-bone-marrow-transplant-crime-lab.html?smid=nytcore-ios-share>.

¹³⁸ As will be discussed, investigators may also inadvertently misinterpret scientific evidence. See *infra* text accompanying notes 178–82.

¹³⁹ See, e.g., Caitlin Flynn, *Did Mark Fuhrman Plant Evidence in the O.J. Simpson Case? He Evoked the Fifth Amendment in Court*, BUSTLE (Mar. 29, 2016), <https://www.bustle.com/articles/150655-did-mark-fuhrman-plant-evidence-in-the-oj-simpson-case-he-evoked-the-fifth-amendment-in> (discussing whether Mark Fuhrman planted the infamous white glove in the O.J. Simpson case); Julia Jacobo, *Baltimore Police Sergeant Planted Drugs in Suspect's Car, Federal Prosecutors Say*, ABC NEWS (Nov. 30, 2017), <https://abcnews.go.com/US/baltimore-police-sergeant-planted-drugs-suspects-car-federal/story?id=51492675> (reporting on a Baltimore police officer's indictment for planting heroin in a car). The *Making a Murderer* Netflix series also included an allegation that the police had removed blood from a syringe in the evidence locker and then used that blood to try to implicate defendant Steven Avery. *Making a Murderer: Indefensible* (Netflix 2015).

¹⁴⁰ See, e.g., Paul C. Giannelli & Kevin C. McMunigal, *Prosecutors, Ethics, and Expert Witnesses*, 76 FORDHAM L. REV. 1493, 1500–01 (2007) (discussing work of prosecution expert whose remarkable ability to secure convictions was apparently based on improper science).

¹⁴¹ In 2018, the Trump White House was accused of putting out a video that had allegedly been tampered with to justify revoking the press credentials of CNN reporter Jim Acosta. Drew Harwell, *White House Shares Doctored Video to Support Punishment of Journalist Jim Acosta*, WASH. POST (Nov. 8, 2018), <https://www.washingtonpost.com/technology/2018/11/08/white-house-shares-doctored-video-support-punishment-journalist-jim-acosta>. As well, a faked video of House Speaker Nancy Pelosi was slowed down to make her appear drunk. Drew Harwell, *Faked Pelosi Videos, Slowed to Make Her Appear Drunk, Spread Across Social Media*, WASH. POST (May 24, 2019),

can be tampered with. While technical means may be devised to try to guard against or detect such chicanery,¹⁴² it seems that at least historically human ingenuity and capacity for deception have inevitably found ways to thrive.

Fourth, even with the most impressive technology, superior wealth and advocacy will likely make a difference. As Marc Galanter explained many years ago, it seems that the “haves” always come out ahead.¹⁴³ This will remain true in our future more heavily technological world in both the civil and criminal context.¹⁴⁴ Wealthier disputants will have greater access to technology, and those with more resources will be able to hire superior advocates and better experts, and thereby better protect their interests.¹⁴⁵

Finally, as is discussed below, it is not possible to consider technological evidence without also raising psychological and even philosophical concerns. Our science, good as it may become, will never stand independently from the humans who both create the technology and then interpret the results.¹⁴⁶ Yet, we humans will inevitably bring to bear our

<https://www.washingtonpost.com/technology/2019/05/23/faked-pelosi-videos-slowed-make-her-appear-drunk-spread-across-social-media>. One new tool is Adobe’s Project VoCo, software being developed to allow for the manipulation of video and audio. Zeyu Jin et al., *VoCo: Text-based Insertion and Replacement in Audio Narration*, 36 ACM TRANSACTIONS ON GRAPHICS 1, 1 (2017). This technology essentially allows for the equivalent of “photoshopping” of audios and videos—substituting in new words and even actions. See, e.g., Kevin Roose, *Here Come the Fake Videos, Too*, N.Y. TIMES (Mar. 4, 2018), <https://www.nytimes.com/2018/03/04/technology/fake-videos-deepfakes.html> (explaining how videos can be altered); Olivia Solon, *The Future of Fake News: Don’t Believe Everything You Read, See or Hear*, GUARDIAN (July 26, 2017), <https://www.theguardian.com/technology/2017/jul/26/fake-news-obama-video-trump-face2face-doctored-content> (explaining how content can be altered).

¹⁴² See *Isn’t Believing: The Fact Checker’s Guide to Manipulated Video*, WASH. POST, https://www.washingtonpost.com/graphics/2019/politics/fact-checker/manipulated-video-guide/?wpisrc=n1_most&wpmm=1 (last visited Jan. 6, 2020).

¹⁴³ Marc Galanter, *Why the “Haves” Come Out Ahead: Speculations on the Limits of Legal Change*, 9 L. & SOC’Y REV. 95, 124–25 (1974); see also WILLIAM T. PIZZI, TRIALS WITHOUT TRUTH 62 (1998) (stating that our justice system tends to favor “sophisticated or wealthy suspects”).

¹⁴⁴ See Keith A. Findley, *Adversarial Inquisitions: Rethinking the Search for the Truth*, 56 N.Y.L. SCH. L. REV. 911, 914 (2011–12) (discussing that prosecutors often prevail simply because they have more resources); Findley, *Innocents at Risk*, *supra* note 135, at 898 (stating that defendants tend to be disadvantaged by disparities and imbalances between parties with regard to discovery, ability, access to resources, etc.).

¹⁴⁵ See, e.g., JEROME FRANK, COURTS ON TRIAL: MYTH AND REALITY IN AMERICAN JUSTICE 81 (Princeton Univ. Press 1973) (1949) (observing that “frequently the partisanship of the opposing lawyers blocks the uncovering of vital evidence or . . . distorts it”); Frankel, *supra* note 13, at 1052 (contending that the adversary system places too much emphasis on contentiousness and too little on truth); see also PIZZI, *supra* note 143, at 25–45, 140–54 (urging that we focus too much on procedural rights and not enough on defendants’ access to adequate representation).

¹⁴⁶ ADAM BENFORADO, UNFAIR: THE NEW SCIENCE OF CRIMINAL INJUSTICE, at xvii–xx (2015) (explaining how the psychology of decision making too often contaminates our criminal investigative systems); DAN SIMON, IN DOUBT: THE PSYCHOLOGY OF THE CRIMINAL JUSTICE PROCESS 1–8 (2012) (explaining why current investigative techniques such as interviews, confessions, and lineups are so prone to produce erroneous results).

human psyches and biases. Moreover, we must consider the serious question of what it means to find “truth.”

2. *But Is There Really a Truth?*

Many twentieth century scholars from disciplines such as philosophy, linguistics, sociology, and psychology have urged that truth-finding is rooted inevitably in our own subjectivity. As noted legal scholar Mirjan Damaška has explained, such philosophical and psychological critiques pose problems for any system of justice aimed at discovering the truth, and particularly for trials:

One of the working assumptions of the practice of adjudication is that truth is in principle discoverable, and that accuracy in fact-finding constitutes a precondition for a just decision. But influential currents of contemporary thought are skeptical of truth as a philosophical principle, and they doubt that the acquisition of objective knowledge is possible.¹⁴⁷

As co-author of a book on lawyering and psychology,¹⁴⁸ I appreciate that even the most seemingly objective facts are subject to challenge from a psychological perspective. Humans are inevitably influenced by our prior knowledge and cannot help but perceive,¹⁴⁹ remember,¹⁵⁰ and process¹⁵¹ new information in light of that which is already stored within our brains.¹⁵² When the internet almost blew up because people were disputing whether a dress was white or blue,¹⁵³ or whether a voice had said “yanny” or “laurel,”¹⁵⁴ we saw that things that are obviously true to us may not be

¹⁴⁷ Mirjan Damaška, *Truth in Adjudication*, 49 HASTINGS L.J. 289, 289 (1998). Damaška discusses, for example, the post-modernist views of Hayden White, the social construction theories of John Searle, “coherence theory,” “correspondence” theory, and “convergence” theory. *Id.* at 290–93; *see also* Carrie Menkel-Meadow, *The Trouble with the Adversary System in a Postmodern, Multicultural World*, 38 WM. & MARY L. REV. 5, 14 (1996) (discussing philosophers, literary critics, art critics, feminist theorists, linguistics, and others who have questioned existence of a knowable stable truth and arguing that the non-adversarial approaches may be best in a world where truth is unknowable).

¹⁴⁸ *See generally* JENNIFER K. ROBBENNOLT & JEAN R. STERNLIGHT, *PSYCHOLOGY FOR LAWYERS: UNDERSTANDING THE HUMAN FACTORS IN NEGOTIATION, LITIGATION, AND DECISION MAKING* (2012) (urging lawyers to draw on cognitive and social psychology to represent their clients more effectively).

¹⁴⁹ *Id.* at 7–27 (discussing psychology of perception).

¹⁵⁰ *Id.* at 29–43 (discussing psychology of memory).

¹⁵¹ *Id.* at 67–83 (discussing psychology of judgment).

¹⁵² *Id.* at 34 (discussing that our memory is colored by information we already have in our minds).

¹⁵³ Jonathan Corum, *Is That Dress White and Gold or Blue and Black?*, N.Y. TIMES (Feb. 27, 2015), <https://www.nytimes.com/interactive/2015/02/28/science/white-or-bluedress.html>.

¹⁵⁴ Rachel Gutman, *A Linguist Explains Why ‘Laurel’ Sounds Like ‘Yanny’*, ATLANTIC (May 15, 2018), <https://www.theatlantic.com/technology/archive/2018/05/dont-rest-on-your-laurels/560483/>.

obviously true to others. Thus, there is great reason to believe that advocates, investigators, and neutrals may all fall prey to preexisting biases.¹⁵⁵

One human error that frequently comes into play is “confirmation bias”—also called “tunnel vision”¹⁵⁶ or more generally, “observer bias.”¹⁵⁷ As commentator Michael Risinger puts it, “[a]n elementary principle of modern psychology is that the desires and expectations people possess influence their perceptions and interpretations of what they observe.”¹⁵⁸ Such preconceptions frequently connect to racial and ethnic biases, such as when (as was recently reported) security guards assumed that an African American woman could not possibly belong in a Yale dorm lounge.¹⁵⁹

Nonetheless, while I appreciate that truth is both elusive and often illusory, I am not ready to reject the truth-finding quest altogether. Socially constructed as our world may be, I am still confident we can at least sometimes find that a light was either red or green at a particular moment in time, that Person A did or did not stab Person B, or even that a product did or did not comply with relevant design criteria.¹⁶⁰ That is, I share Mirjan Damaška’s conclusion that it is appropriate to search for truth in the legal context, even while recognizing the challenges. He states, “the cultivation of truth-values remains important for all adjudication,”¹⁶¹ explaining that even though adjudicators may not be able to acquire objective knowledge

¹⁵⁵ See, e.g., Mirjan Damaška, *Presentation of Evidence and Factfinding Precision*, 123 U. PA. L. REV. 1083, 1092–1106 (1975) (discussing psychological factors likely to lead both lawyer advocates and judges to stray from the truth); Dan Simon et al., *Adversarial and Non-Adversarial Investigations: An Experiment* 17 (May 15, 2009), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1401723 (finding, in experiment, that assigning person to role, whether as attorney or as investigator, significantly impacted their perspective on disputed “facts”).

¹⁵⁶ Keith A. Findley & Michael S. Scott, *The Multiple Dimensions of Tunnel Vision in Criminal Cases*, 2006 WIS. L. REV. 291, 292–95 (2006); see also Kent Roach, *Forensic Science and Miscarriages of Justice: Some Lessons from a Comparative Experience*, 50 JURIMETRICS 67, 81–82 (2009) (discussing need to insulate crime labs from dangers of confirmation bias).

¹⁵⁷ D. Michael Risinger et al., *The Daubert/Kumho Implications of Observer Effects in Forensic Science: Hidden Problems of Expectation and Suggestion*, 90 CALIF. L. REV. 1, 13 n.52 (2002).

¹⁵⁸ *Id.* at 6.

¹⁵⁹ Christina Caron, *A Black Yale Student Was Napping, and a White Student Called the Police*, N.Y. TIMES (May 9, 2018), <https://www.nytimes.com/2018/05/09/nyregion/yale-black-student-nap.html>. Scientists in a variety of fields have recognized the existence of such biases, and some have endeavored to structure their own research to correct for such preconceptions. Risinger et al., *supra* note 157, at 8 (discussing observer effects in various scientific fields including in the work of Isaac Newton and Gregor Mendel).

¹⁶⁰ Cf. Menkel-Meadow, *The Trouble with the Adversary System*, *supra* note 147, at 17–18 (pointing out that a single truth is hardest to find for disputes that are complex and polycentric rather than binary in nature).

¹⁶¹ Damaška, *Truth in Adjudication*, *supra* note 147, at 289–90 (“[W]hile ‘post-modern’ thought may be usefully unsettling for some intellectual pursuits, it is of little use in evidence law.”).

independent of human beliefs, they only need “to establish events and phenomena in the socially created world.”¹⁶²

The implications of this perspective for the new technology discussed in this Article are nuanced. Given human frailties, we want our new technology to help us contend with some of the truth-finding problems that are inherent in human perception, memory, and analysis. Yet, whether we are considering photos, videos, retinal scans, DNA, or any other technology, it turns out that the science does not “speak for itself.” Rather, investigators, judges, jurors, mediators, or members of the community are all human, and thus view, process, and remember information, technological or not, through human filters. We cannot use technology to escape human subjectivity after all.¹⁶³

Indeed, the fact that technology may *seem* to reveal a single truth is more dangerous than the problems we faced in earlier times, when we were more obviously dependent on flawed evidence such as eyewitness testimony. We tend to trust our eyes and our ears.¹⁶⁴ Yet, as Supreme Court Justice Benjamin Cardozo put the matter: “We may try to see things as objectively as we please. None the less, we can never see them with any eyes except our own.”¹⁶⁵ So, the technology lures us with apparent objectivity but can never deliver on that promise.

Several recent controversies show how human psychology has impacted the interpretation of seemingly indisputable video evidence. In *Scott v. Harris*, eight Supreme Court Justices famously relied on their own viewing of a police dash cam video of a car chase to conclude that the plaintiff could not possibly prevail on his claim that the police used excessive force.¹⁶⁶ Indeed, Justice Scalia wrote in the majority opinion, “[w]e are happy to allow the videotape to speak for itself.”¹⁶⁷ However, Supreme Court Justice

¹⁶² *Id.* at 292. See also PETER L. BERGER & THOMAS LUCKMANN, *THE SOCIAL CONSTRUCTION OF REALITY: A TREATISE IN THE SOCIOLOGY OF KNOWLEDGE* 13 (1966) (distinguishing reality from knowledge); JOHN R. SEARLE, *THE CONSTRUCTION OF SOCIAL REALITY* 1–2 (1995) (distinguishing “brute” facts such as the existence of Mt. Everest from “institutional” or socially constructed facts such as the existence of money).

¹⁶³ See SIMON, *IN DOUBT*, *supra* note 146, at 2 (“One of the obvious features of the criminal justice process is that it is operationalized mostly through people: witnesses, detectives, suspects, lawyers, judges, and jurors.”).

¹⁶⁴ See generally NEAL FEIGENSON & CHRISTINA SPIESEL, *LAW ON DISPLAY: THE DIGITAL TRANSFORMATION OF LEGAL PERSUASION AND JUDGMENT* 8 (2009) (discussing perceived objectivity and impartiality of images); Rebecca Tushnet, *Worth a Thousand Words: The Images of Copyright*, 125 HARV. L. REV. 683, 689–92 (2012) (discussing the seductive power of images, in that they seem pure but nonetheless frame worldviews).

¹⁶⁵ Benjamin N. Cardozo, *The Nature of the Judicial Process*, 1 J.L. 329, 331 (2011). See also Itiel E. Dror et al., *Contextual Information Renders Experts Vulnerable to Making Erroneous Identifications*, 156 FORENSIC SCI. INT’L 74, 74 (2006) (arguing that forensic science fields are not as objective as they should be).

¹⁶⁶ *Scott v. Harris*, 550 U.S. 372, 374, 378–81, 386 (2007).

¹⁶⁷ *Id.* at 378 n.5.

Stevens watched the same video and came to a different conclusion, as did the district court judge and three judges on the court of appeals.¹⁶⁸ Inspired by the Justices' disparate views, and Justice Scalia's assertion that the video spoke for itself, researchers conducted a study looking at how 1350 people of diverse backgrounds would view the video at issue in *Scott v. Harris*.¹⁶⁹ They found that "members of various subcommunities" tended to view the facts differently than had the eight Justices.¹⁷⁰ Specifically, "African-Americans, low-income workers and residents of the Northeast . . . tended to form more pro-plaintiff views of the facts than did the Court," as did "individuals who characterized themselves as liberals and Democrats."¹⁷¹ While we may not be able to say one group is more "right" than the other, studies like these show that perception and cognition can be "motivated" by one's prior beliefs and experiences.¹⁷²

One does not need to look far to find additional real-world examples of this same phenomenon. Viewing video of a demonstration at the Lincoln Memorial in 2019, some saw white high school students disrespect a Native American elder and others saw the white high school students being disrespected by other protesters.¹⁷³ In other examples, did a police body cam video show that the minority group member engaged in a threatening gesture?¹⁷⁴ Did footage of the demonstrations in Charleston, South Carolina

¹⁶⁸ *Id.* at 389. Justice Stevens opined that he viewed the video differently because he had more experience than the other Justices driving on country roads. *Id.* at 390 n.1.

¹⁶⁹ Dan M. Kahan et al., *Whose Eyes are You Going to Believe? Scott v. Harris and the Perils of Cognitive Illiberalism*, 122 HARV. L. REV. 837, 854 (2009).

¹⁷⁰ *Id.* at 841.

¹⁷¹ *Id.*

¹⁷² See also Howard M. Wasserman, *Mixed Signals on Summary Judgment*, 2014 MICH. ST. L. REV. 1331, 1337 ("[V]ideo cannot, as *Scott* insisted and *Plumhoff* assumed, speak for itself. What video actually says depends on a number of different considerations—who and what is depicted, who created the images, and details of the images themselves (such as length, clarity, lighting, distance, angle, scope, steadiness, quality)."). In the laboratory, psychologists have performed many studies that show perception is linked to prior beliefs. See, e.g., Dan M. Kahan et al., "They Saw a Protest": *Cognitive Illiberalism and the Speech-Conduct Distinction*, 64 STAN. L. REV. 851, 853 (2012) (explaining how a student's loyalty to their institution shaped how they viewed and interpreted a video); Avani Mehta Sood & John M. Darley, *The Plasticity of Harm in the Service of Criminalization Goals*, 100 CALIF. L. REV. 1313, 1336, 1340 (2012) (discussing how personal beliefs influenced the participant's reported perceptions).

¹⁷³ Michael Miller, *A Tribal Elder and a High School Junior Stood Face to Face, and the World Reacted*, WASH. POST (Jan. 21, 2019), <https://www.msn.com/en-us/news/us/a-tribal-elder-and-a-high-school-junior-stood-face-to-face-and-the-world-reacted/ar-BBSwlbl>. See also Christine Emba, *What a Dead Samurai Can Teach Us About the Covington Controversy*, WASH. POST (Jan. 24, 2019), https://www.washingtonpost.com/opinions/what-a-dead-samurai-can-teach-us-about-the-covington-controversy/2019/01/24/eeddee12-201d-11e9-8e21-59a09ff1e2a1_story.html?utm_term=.61aefa5aa3a3 (describing how the incident can be viewed from four different perspectives).

¹⁷⁴ Timothy Williams et al., *Police Body Cameras: What Do You See?*, N.Y. TIMES, <https://www.nytimes.com/interactive/2016/04/01/us/police-bodycam-video.html> (last updated Apr. 1, 2016). See also Vivian Yee & Kirk Johnson, *Body Cameras Worn by Police Officers are No 'Safeguard of Truth,' Experts Say*, N.Y. TIMES (Dec. 6, 2014),

over removal of the Robert E. Lee statue show that protestors and counter-protestors engaged in similar acts of violence?¹⁷⁵ Did a video of a purported confession show the confession was made voluntarily?¹⁷⁶ Opinions will be shaped by prior knowledge and opinions, the portion of video one watches, and the physical perspective from which the video is taken.¹⁷⁷

This same psychology impacts our review of other scientific evidence as well as videos. In 2004, the FBI was called-in to help solve a train bombing that had occurred in Madrid, Spain.¹⁷⁸ Three expert FBI fingerprint analysts all erroneously confirmed that a partial print found on a plastic bag in a car containing bomb-related materials was a “100% match” for the print of Oregon attorney Brandon Mayfield, who happened to be Muslim.¹⁷⁹ Mayfield, whose prints were available because of his prior military service and an arrest years earlier,¹⁸⁰ was detained for several weeks before he was ultimately released when Spanish authorities found the actual perpetrator, also using fingerprint evidence.¹⁸¹ Subsequent studies showed how and why the presumably well-meaning FBI agents fell prey to psychological biases, such as the confirmation bias discussed above, that led them to make significant mistakes.¹⁸² Researchers have identified many similar investigatory errors by a variety of investigative bodies.¹⁸³

<https://www.nytimes.com/2014/12/07/nyregion/body-cameras-worn-by-police-officers-are-no-safeguard-of-truth-experts-say.html> (stating that body camera footage is not always decisive).

¹⁷⁵ Jacey Fortin, *The Statue at the Center of Charlottesville’s Storm*, N.Y. TIMES (Aug. 13, 2017), <https://www.nytimes.com/2017/08/13/us/charlottesville-rally-protest-statue.htm>.

¹⁷⁶ G. Daniel Lassiter et al., *Evaluating Videotaped Confessions: Expertise Provides No Defense Against the Camera-Perspective Effect*, 18 PSYCHOL. SCI. 224, 224–26 (2007).

¹⁷⁷ FAN, *supra* note 52, at 15 (“How the camera is positioned, and how people are framed, can influence our perceptions of what is happening.”); Mary D. Fan, *Justice Visualized: Courts and the Body Camera Revolution*, 50 U.C. DAVIS L. REV. 897, 948 (2017) (“While the camera seems to be an unbiased eye, camera perspective can powerfully shape viewer judgments . . .”).

¹⁷⁸ Sarah Kershaw et al., *Spain and U.S. at Odds on Mistaken Terror Arrest*, N.Y. TIMES (June 5, 2004), <https://www.nytimes.com/2004/06/05/us/spain-and-us-at-odds-on-mistaken-terror-arrest.html>.

¹⁷⁹ HARRIS, *supra* note 79, at 3–5.

¹⁸⁰ *Id.* at 3.

¹⁸¹ *Id.*

¹⁸² *Id.* at 3–5; Giannelli, *Wrongful Convictions and the Need to Regulate Crime Labs*, *supra* note 135, at 203–05, 221–22; Saks & Faigman, *Failed Forensics*, *supra* note 37, at 158.

¹⁸³ Brandon L. Garrett & Peter J. Neufeld, *Invalid Forensic Science Testimony and Wrongful Convictions*, 95 VA. L. REV. 1, 9 (2009) (finding that prosecution forensic experts had given invalid testimony, such as by misstating empirical data, in sixty percent of studied wrongful conviction cases). See generally Dan Simon, *Minimizing Error and Bias in Death Investigations*, 49 SETON HALL L. REV. 255, 255–58 (2019) (exploring the effect of confirmation bias on death investigations and proposing solutions).

B. *Justice Involves More than Truth*

Although current U.S. commentators tend to emphasize the centrality of truth-finding to justice, systems of justice across time and around the world, have recognized that justice involves more than truth.

1. *Trials*

While trials, as discussed, focus substantially on truth,¹⁸⁴ they also focus on many non-truth issues. For example, we use trials to determine appropriate remedies, provide disputants with procedural justice, educate the public, and consider a variety of monetary and non-monetary goals and costs.

i. Remedies

Even assuming the truth of an alleged crime or civil infraction were known, prosecutors, judges, jurors, or other decisionmakers would need to determine appropriate remedies. In criminal cases, remedial determinations may include consideration of historical truth, but inevitably also involve assessments of motive, emotion, predictions of future conduct, and state of mind. For example, as prosecutors offer plea bargains or propose sentences, they may consider what resolution would best help a wrongdoer reintegrate into society.¹⁸⁵ Similarly, once a defendant is found guilty in a criminal trial, a sentencing judge typically considers such factors as the defendant's prior criminal record, family history, state of mind, acceptance of responsibility, and potential positive contributions to society. These factors are typically considered relevant to sentencing,¹⁸⁶ and to whether the defendant should be ordered or allowed to commence drug treatment or other programs.¹⁸⁷ Particularly given the problems and costs of mass incarceration,¹⁸⁸ more and

¹⁸⁴ See *supra* Section II.A.

¹⁸⁵ Julie A. Lumpkin, *The Standard of Proof Necessary to Establish That a Defendant Has Materially Breached A Plea Agreement*, 55 FORDHAM L. REV. 1059, 1064 (1987) (explaining that plea bargaining facilitates rehabilitation).

¹⁸⁶ See, e.g., Andrea Avila, *Consideration of Rehabilitative Factors for Sentencing in Federal Courts: Tapia v. United States*, 131 S. Ct. 2382 (2011), 92 NEB. L. REV. 404, 405–10 (2013) (discussing the decline of the rehabilitative model of punishment and the implementation of the Federal Sentencing Guidelines); Kathleen Landis, *Determinate Sentencing and the Rise of Alternative Sanctions: Does Shame Meet the Goals of Sentencing Reform?*, 55 WASH. U. J.L. & POL'Y 243, 256–63 (2017) (discussing factors that might lead a judge to impose community service rather than more conventional punishments).

¹⁸⁷ CYNTHIA ALKON & ANDREA KUPFER SCHNEIDER, *NEGOTIATING CRIME: PLEA BARGAINING, PROBLEM SOLVING, AND DISPUTE RESOLUTION IN THE CRIMINAL CONTEXT* 275–406 (2019) (discussing problem solving courts and therapeutic justice).

¹⁸⁸ See, e.g., GREG BERMAN & JULIAN ADLER, *START HERE: A ROAD MAP TO REDUCING MASS INCARCERATION* 4–12 (2018) (discussing the “negative effects of incarceration” and how to lessen them); Anne R. Traum, *Mass Incarceration at Sentencing*, 64 HASTINGS L.J. 423, 431–36 (2013) (discussing the “[b]roader [h]arms of [m]ass [i]ncarceration”); see generally JACOB KANG-BROWN ET AL., *THE NEW DYNAMICS OF MASS INCARCERATION* (2018) (providing updated insights on the mass incarceration phenomenon).

more U.S. jurisdictions are beginning to implement programs, at least for minor crimes, that allow judges to take more creative approaches to sentencing.¹⁸⁹ Sometimes these jurisdictions establish “problem solving courts” geared to reintegrate offenders back into the community¹⁹⁰ after helping with underlying issues including drugs, mental health, and veterans’ experiences. These broader kinds of factors are also relevant as parole boards consider whether convicted jailed criminals should be released back into society.¹⁹¹

With regard to civil remedies, judges and juries may sometimes consider whether an appropriate remedy is necessary not only to compensate a wronged plaintiff, but also to punish a defendant or deter other potential defendants from engaging in similar behavior.¹⁹² Remedies may involve monetary payments, but sometimes include non-monetary injunctions or declarations of law as well. Policy concerns, fairness, and morality often enter into such remedial determinations.¹⁹³

ii. Procedural Justice

We also consider issues other than truth in trials to the extent we endeavor to provide what social psychologists have called “procedural justice.”¹⁹⁴ Specifically, researchers have found that people greatly value being provided with an opportunity to voice their concerns, be treated with dignity, and have a perceived neutral third party consider their perspectives.¹⁹⁵ While we generally focus on how best to provide procedural

¹⁸⁹ See *How Can America Reduce Mass Incarceration?*, FRESH AIR PODCAST (Aug. 8, 2018), <https://www.npr.org/2018/08/06/636046653/how-can-america-reduce-mass-incarceration> (discussion regarding “alternatives to jail, including community service, social services and even personal essays”).

¹⁹⁰ See, e.g., GREG BERMAN ET AL., *GOOD COURTS: THE CASE FOR PROBLEM-SOLVING JUSTICE* 31–33 (2005) (defining problem solving courts and describing their use); DOUGLAS B. MARLOWE ET AL., NAT’L DRUG COURT INST., *PAINTING THE CURRENT PICTURE: A NATIONAL REPORT ON DRUG COURTS AND OTHER PROBLEM-SOLVING COURTS IN THE UNITED STATES* 10 (2016) (reviewing problem solving courts); Jessica K. Steinberg, *A Theory of Civil Problem-Solving Courts*, 93 N.Y.U. L. REV. 1579, 1580–81 (2018) (discussing uses of problem solving courts).

¹⁹¹ See Victoria J. Palacios, *Go and Sin No More: Rationality and Release Decisions by Parole Boards*, 45 S.C. L. REV. 567, 579–80 (1994) (discussing multiple factors considered in parole decisions).

¹⁹² See *BMW of N. Am., Inc. v. Gore*, 517 U.S. 559, 568 (1996) (explaining that “[p]unitive damages may properly be imposed to further a State’s legitimate interests in punishing unlawful conduct and deterring its repetition”).

¹⁹³ See generally MARTHA MINOW, *WHEN SHOULD LAW FORGIVE?* (2019) (discussing whether and when legal institutions and legal officials should promote forgiveness rather than punishment).

¹⁹⁴ See generally E. ALLAN LIND & TOM R. TYLER, *THE SOCIAL PSYCHOLOGY OF PROCEDURAL JUSTICE* 1–5 (1988); Paul G. Chevigny, *Lind & Tyler, The Social Psychology of Procedural Fairness*, 64 N.Y.U. L. REV. 1211 (1989) (book review).

¹⁹⁵ See, e.g., JOHN THIBAUT & LAURENS WALKER, *PROCEDURAL JUSTICE: A PSYCHOLOGICAL ANALYSIS* (1975); Tom R. Tyler & E. Allan Lind, *Procedural Justice*, in *HANDBOOK OF JUSTICE RESEARCH IN LAW* 65 (Joseph Sanders & V. Lee Hamilton eds., 2001); Laurens Walker et al., *Reactions of Participants and Observers to Modes of Adjudication*, 4 J. APPLIED SOC. PSYCHOL. 295 (1974). See generally Donna Shestowsky, *Disputants’ Preferences for Court-Connected Dispute Resolution*

justice to the immediate disputants, these same factors may sometimes lead us to allow victims or others to participate in trials as well, so they too can feel heard.¹⁹⁶ Thus, even if technology provided the truth of what had happened, there would be other issues to consider in setting up trials.

iii. Education and Communal Values

Trials can also serve societal purposes, such as educating the public as to rules and values, forming or maintaining communal bonds, and allowing affected persons or community members to express their emotions. For example, one of the earliest trials that was written about, albeit mythical, involved Orestes's killing of his mother, Clytemnestra.¹⁹⁷ Orestes's father, Agamemnon, had sacrificed his daughter Iphigenia and then abducted another woman, Cassandra, to become his concubine. Orestes's mother, understandably displeased with this turn of events, killed Agamemnon when he returned home. Orestes then killed his mother to avenge her killing of his father, leaving the Gods to decide what should now happen to Orestes. Should he be punished for his act? To resolve the matter, the goddess Athena set up a trial at which Athenian citizens would decide Orestes's fate.¹⁹⁸ The purpose of this trial was not to ascertain truth or facts, which were known to all, but rather to decide whether the killing was justified. After much discussion, the jury split evenly, but Athena broke the tie by voting in favor of Orestes.¹⁹⁹ By holding the trial in public, Athena hoped to calm those gods who had been angered by the killing, and the trial also served to air citizens' concerns over the events.²⁰⁰

Procedures: Why We Should Care and Why We Know So Little, 23 OHIO ST. J. ON DISP. RESOL. 549 (2008) (arguing that "courts should aim to gain greater clarity about disputants' preferences, and work to deliberately implement those preferences"). Cf. Valerie Jenness & Kitty Calavita, "It Depends on the Outcome": Prisoners, Grievances, and Perceptions of Justice, 52 LAW & SOC'Y REV. 41 (2018) (finding that men incarcerated in California prisons focus substantially on the outcome of disputes as their measure of justice).

¹⁹⁶ See, e.g., Scott Cacciola, *Victims in Larry Nassar Abuse Case Find a Fierce Advocate: The Judge*, N.Y. TIMES (Jan. 23, 2018), <https://www.nytimes.com/2018/01/23/sports/larry-nassar-rosemarie-aquilina-judge.html> (discussing how trial judge allowed victims of Dr. Larry Nassar to tell their story in open court).

¹⁹⁷ Aeschylus famously described these events in his three-part play, *Oresteia*, which one author has called "the oldest known courtroom drama in history." SADAKAT KADRI, *THE TRIAL: A HISTORY, FROM SOCRATES TO O.J. SIMPSON* 4 (2005). These mythical events are also discussed by Homer in *The Odyssey*, and by Euripides in his play, *Orestes*. See, e.g., 1 ROBERT J. BONNER & GERTRUDE SMITH, *THE ADMINISTRATION OF JUSTICE FROM HOMER TO ARISTOTLE* 125–29 (AMS Press 1970) (1930). For an excellent discussion of how justice is described in several Greek trials, see David Luban, *Some Greek Trials: Order and Justice in Homer, Hesiod, Aeschylus and Plato*, 54 TENN. L. REV. 279 (1987).

¹⁹⁸ BONNER & SMITH, *supra* note 197, at 125–29; KADRI, *supra* note 197, at 4–5.

¹⁹⁹ Luban, *supra* note 197, at 295–96.

²⁰⁰ *Id.* at 297 (explaining that Athena thought the public trial was necessary to appease the Furies and thereby protect the city).

For another illustration, we can look to medieval Europe, where it was fairly common to put animals and insects on trial for a variety of alleged misdeeds—including eating human crops, harming or killing humans, or having sexual relations with humans.²⁰¹ One of the most famous of such trials involved felony charges brought against the rats of Autun, France, in 1522.²⁰² In that case, as in others, an attorney was appointed to represent the animals.²⁰³ Along similar lines, the Athenians even held trials for inanimate objects, such as stones or pieces of metal that caused harm to humans.²⁰⁴ Clearly the purpose of such trials was neither to find the truth nor to deter animals, insects, or inanimate objects from misbehaving in the future. Rather, while the trials did reach real conclusions (such as killing the animals, dropping charges, or working out a settlement),²⁰⁵ presumably the purpose of these trials had more to do with their educational or emotional impact on human observers.²⁰⁶ More recently, we might consider the trial of sexual abuser Dr. Larry Nassar, from Michigan State, in which the judge allowed victims to directly confront their abuser.²⁰⁷ Again the point of the interaction was not mere truth-finding.

Some other trials have served a more propagandist, educational, or communal purpose. At various points in history, throughout the world, powerful leaders have used “trials” to cement their victory over those they have vanquished. Whether one thinks of the trial of Louis XVI during the French Revolution,²⁰⁸ the Moscow “Show Trials,”²⁰⁹ or even the Nuremberg Trials, one can see that the pomp and circumstance of a trial is sometimes used for purposes different than ascertaining the truth. The Nuremberg trials of Nazi officers at the end of World War II were not primarily designed to

²⁰¹ KADRI, *supra* note 197, at 146–58. See E.P. EVANS, *THE CRIMINAL PROSECUTION AND CAPITAL PUNISHMENT OF ANIMALS* 1–17 (3d prtg. 2000) (explaining multiple purposes of trying animals and insects including expurgation of evil spirits and protecting the community from future harms).

²⁰² William Ewald, *Comparative Jurisprudence (I): What Was it Like to Try a Rat?*, 143 U. PA. L. REV. 1889, 1898 (1995) (discussing charges brought against rats for “having eaten and wantonly destroyed some barley crops in the jurisdiction”).

²⁰³ Attorney Barthelmy Chassenée argued his rat clients had not been provided with due notice of the proceedings and did not have adequate opportunity to make their appearance, due to plaintiffs’ cats. *Id.* at 1898–99. Other cases involving attacks by beetles or weevils on crops resulted in settlements, such as the setting aside of plots of land for the use of the insects. KADRI, *supra* note 197, at 146.

²⁰⁴ Ewald, *supra* note 202, at 1912.

²⁰⁵ See, e.g., *id.* at 1903–04 (quoting Shakespeare’s mention in *The Merchant of Venice* of a wolf “hanged for human slaughter” and also taking note of cows and pigs condemned to death).

²⁰⁶ See *id.* at 1905 (“[W]hat needs to be explained is not why one would put down a dangerous cow, but why one would first bring the matter to the Law Faculty of Leipzig.”).

²⁰⁷ Sophie Gilbert, *The Transformative Justice of Judge Aquilina*, ATLANTIC (Jan. 25, 2018), <https://www.theatlantic.com/entertainment/archive/2018/01/judge-rosemarie-aquilina-larry-nassar/551462/>. Cf. Kelly Hayes & Mariame Kaba, *The Sentencing of Larry Nassar Was Not ‘Transformative Justice.’ Here’s Why*, APPEAL (Feb. 5, 2018), <https://theappeal.org/the-sentencing-of-larry-nassar-was-not-transformative-justice-here-s-why-a2ea323a6645/>.

²⁰⁸ DAVID P. JORDAN, *THE KING’S TRIAL: LOUIS XVI VS. THE FRENCH REVOLUTION* 44–45 (2004).

²⁰⁹ KADRI, *supra* note 197, at 178 (discussing Moscow Show Trials).

find out what the officers had done, but rather to provide a venue in which the responsibility of the perpetrators of injustice could be explored, and through which the public could be educated.²¹⁰ And, at the same time, these goals caused some to worry that the Nuremberg trials “might set an example of high politics masquerading as law.”²¹¹

Whether high-minded or cynical, bringing together the community to discuss an important event may serve some purposes, including allowing community members to express their desires for vengeance or other emotions, to bond with other community members, to learn more about events that have transpired, to consider whether forgiveness might be possible, or to become educated as to potential next steps. Such hearings can also lead people to believe that the world has been put back into balance by punishing morally culpable animals, insects, or inanimate objects. While we no longer hold trials for animals or inanimate objects, it seems that some of these purposes remain part of our system of justice.

iv. Other Goals and Costs

In addition to truth, appropriate remedies, procedural justice, and education, other goals and costs have been and should be considered relevant to justice. As Professor Alan Dershowitz has explained: “Our system of justice . . . reflects a balance among often inconsistent goals, which include truth, privacy, fairness, finality, and quality.”²¹² Many years ago, political philosopher Jeremy Bentham expressed a similar thought, stating that while it is desirable to uncover truth, one also has to consider the costs of doing so—whether in terms of money, time, privacy, fairness, or vexation.²¹³ Thus, in our country and others, we sometimes design procedural rules and investigatory practices to protect privacy, limit evidence,²¹⁴ or exclude results of improper searches. That is, aspects of our practices and procedures

²¹⁰ See Telford Taylor, *The Nuremberg Trials*, 55 COLUM. L. REV. 488, 498 (1955) (noting how Justice Jackson saw the Nuremberg Trials as an “unsettled period” that would “direct the world’s thought toward a firmer enforcement of the laws of international conduct” (internal citation omitted)).

²¹¹ Charles E. Wyzanski, *Nuremberg: A Fair Trial? A Dangerous Precedent*, ATLANTIC (April 1946), <https://www.theatlantic.com/magazine/archive/1946/04/nuremberg-a-fair-trial-a-dangerous-precedent/306492/>.

²¹² ALAN DERSHOWITZ, REASONABLE DOUBTS 42 (1996). See also SIMON, IN DOUBT, *supra* note 146, at 209 (noting that goals of trials include “promoting public acceptance of verdicts, expressing society’s values, asserting the authoritative power of the state, bringing closure to victims, and finalizing disputes”); Freedman, *supra* note 13, at 1063 (urging that while a trial is, in part, a search for truth, it also serves many other purposes, including protecting the parties’ dignity interests and constitutional rights).

²¹³ John D. Jackson, *Theories of Truth Finding in Criminal Procedure: An Evolutionary Approach*, 10 CARDOZO L. REV. 475, 483 (1988) (citing 5 JEREMY BENTHAM, A RATIONALE OF JUDICIAL EVIDENCE bk. 10, ch. 10, at 736–47 (photo. reprt. 1978) (1827)).

²¹⁴ See, e.g., PIZZL, *supra* note 143, at 48 (noting that “in the United States we have very tight rules of evidence”).

are geared to serve interests in fairness and justice and not merely lead to the discovery of the truth.²¹⁵

In sum, trials, both currently and historically, have been designed to do far more than uncover the truth. Despite what we often say, truth is not and has never been our exclusive goal nor certainly a guaranteed result of trials. We must keep these additional ideas in mind as we think about how best to design a system of justice to accommodate our new technology.

2. *Non-Adjudicatory Processes*

Trials are not the only means by which societies seek justice in civil and criminal matters. Whether one looks cross-culturally, historically, or at current practices in the United States, one will see that other non-adjudicatory²¹⁶ mechanisms, including negotiation, mediation, community conferencing, and variants thereof, have been and are being used to resolve disputes.²¹⁷

Historically and cross-culturally, many societies' systems of justice have placed far greater emphasis on harmony and healing than on adjudicatory individualistic approaches.²¹⁸ In ancient Greece, philosopher Plato emphasized that justice consisted of a harmony—all elements of the society working well together.²¹⁹ Similarly, many African, Pacific Island,

²¹⁵ See, e.g., Findley, *Adversarial Inquisitions*, *supra* note 135, at 917 (“Appeals instead focus almost entirely on *process* questions—was the trial conducted in accordance with the rules?—rather than truth questions.”); Dan Simon, *The Limited Diagnosticity of Criminal Trials*, 64 VAND. L. REV. 143, 204 (2011) (“Notwithstanding occasional pronouncements of the importance of finding the truth, that goal is effectively eclipsed by the prescribed procedural regime.”). See generally Herbert L. Packer, *Two Models of the Criminal Process*, 113 U. PA. L. REV. 1 (1964) (juxtaposing a Due Process model and a Crime Control model of criminal justice).

²¹⁶ While some distinguish “adversarial” and “non-adversarial” processes, I prefer to distinguish “adjudicatory” and “non-adjudicatory” processes. By “adjudicatory” I mean those processes (trials and arbitration) that seek to find a single truth. Negotiations and mediations, by contrast, may resolve disputes without purporting to find a single truth. Disputants may be adverse and even hostile to one another in both kinds of processes. See generally Jean R. Sternlight, *Is Binding Arbitration a Form of ADR?: An Argument That the Term “ADR” Has Begun to Outlive its Usefulness*, 2000 J. DISP. RESOL. 97.

²¹⁷ For general background on non-adjudicatory processes, see generally STEPHEN B. GOLDBERG, *DISPUTE RESOLUTION: NEGOTIATION, MEDIATION, AND OTHER PROCESSES* (6th ed. 2012) (describing the field of conflict resolution); CARRIE MENKEL-MEADOW ET AL., *DISPUTE RESOLUTION: BEYOND THE ADVERSARIAL PROCESS* (3d ed. 2018) (detailing different types of non-adjudicatory processes).

²¹⁸ See, e.g., Carrie Menkel-Meadow, *Restorative Justice: What is it and Does it Work?* 10.2 (Georgetown Pub. Law & Legal Theory, Research Paper No. 1005485, 2007), <http://ssrn.com/abstract=1005485> (“Restorative justice is the name given to a variety of different practices, including apologies, restitution, and acknowledgments of harm and injury, as well as to other efforts to provide healing and reintegration of offenders into their communities, with or without additional punishment.”); see also KEVIN AVRUCH, *CULTURE AND CONFLICT RESOLUTION* 12–15, 23–26 (1998) (describing conflict resolution values throughout different societies).

²¹⁹ See, e.g., Plato, *The Republic Book IV*, in *GREAT DIALOGUES OF PLATO* 271, 283 (W.H.D. Rouse trans., 1961). See also STUART HAMPSHIRE, *JUSTICE IS CONFLICT* 3–4 (2000) (stating that according to Plato, “justice consists in a harmony of the parts or elements, a harmony imposed by reason”); Andrew W. McThenia & Thomas L. Shaffer, *For Reconciliation*, 94 YALE L.J. 1660, 1665 (1985) (“Justice is

Native American, and other societies have focused on bringing the society or tribe back into balance, or on achieving harmony or reconciliation among members of the society.²²⁰ For example, Native Hawaiians used a process called “ho’oponopono,” which is drawn from the concept of disentangling fishing lines,²²¹ and Navajo Indians traditionally used a community conferencing process geared to heal and restore the society.²²² As well, even within the United States, smaller and sub-communities have used restorative and healing approaches throughout our history.²²³

Examples of non-adjudicatory approaches to dispute resolution also exist within our current United States system of justice. Notably, though many conceive of our system as trial-based, the vast majority of criminal and civil matters are resolved through negotiation rather than through trials. On the criminal side, the Supreme Court has stated that between ninety-four and ninety-seven percent of cases are resolved through plea bargains,²²⁴ and most filed civil matters are also settled.²²⁵ Many court programs now include mandatory mediation and settlement conferences before permitting a matter

what we discover—you and I, Socrates said—when we walk together, listen together, and even love one another, in our curiosity about what justice is and where justice comes from.”).

²²⁰ See, e.g., CONFLICT RESOLUTION: CROSS-CULTURAL PERSPECTIVES (Kevin Avruch et al. eds., 1991) (cataloging different approaches to conflict resolution throughout cultures); Laura Nader, *Styles of Court Procedure: To Make the Balance*, in LAW IN CULTURE AND SOCIETY 69, 69–92 (Laura Nader ed., 1969) (describing the balancing dispute resolution approach taken by Mexican Zapotec Indians); 2 THE POLITICS OF INFORMAL JUSTICE 15–79 (Richard L. Abel ed., 1982) (presenting discussion of various countries’ reliance on informal justice).

²²¹ See, e.g., James A. Wall, Jr. & Ronda Roberts Callister, *Ho’oponopono: Some Lessons from Hawaiian Mediation*, 11 NEGOT. J. 45, 47 (1995) (explaining that traditional Hawaiian process aims to put things right, both spiritually and interpersonally, and ideally achieve mutual forgiveness).

²²² See, e.g., Robert Yazzie, “Life Comes From It”: Navajo Justice Concepts, 24 N.M. L. REV. 175, 177–87 (1994) (contrasting the Western “vertical” system of justice, which relies on hierarchy and power to resolve disputes, to the Navajo “horizontal” system, in which no authority has to determine what is true and the goal is healing and restoration rather than determining right and wrong).

²²³ See generally JEROLD S. AUERBACH, JUSTICE WITHOUT LAW? (1983) (considering non-adversarial approaches used by various American communities over the last several hundred years); THE POLITICS OF INFORMAL JUSTICE, *supra* note 220, at 18–21 (describing the American experience with informal justice).

²²⁴ *Missouri v. Frye*, 566 U.S. 134, 143 (2012). The Court explicitly recognized that “ours ‘is for the most part a system of pleas, not a system of trials.’” *Id.* (quoting *Lafler v. Cooper*, 132 S. Ct. 1376, 1388 (2012)). See generally ALKON & SCHNEIDER, NEGOTIATING CRIME, *supra* note 187.

²²⁵ See Marc Galanter, *The Vanishing Trial: An Examination of Trials and Related Matters in Federal and State Courts*, 1 J. EMPIRICAL LEGAL STUD. 459, 460 (2004) (tracking the decline of civil trials in America).

to be heard in court.²²⁶ More generally, restorative²²⁷ and transformative²²⁸ approaches are being used in courts and public policy settings throughout the world.

While the differences among and between these processes are many, we focus here on the approach of non-adjudicatory processes to truth-finding. In short, truth-finding is not the focus of these processes. By contrast to trials, which typically look backwards to determine the truth of what happened and determine a consequent punishment or remedy, non-adjudicatory processes typically look forward. Disputants in non-adjudicatory processes may certainly care about their perceptions of what happened in the past, but civil disputes of all kinds are often resolved with settlement agreements that specifically disclaim findings of fault or responsibility.²²⁹ Similarly, although criminal defendants must often plead guilty to a crime to obtain their reduced sentence,²³⁰ these pleas are done with at least a bit of a wink, so that few assume that a plea agreement is really a factual determination.²³¹ As advocates of non-adjudicatory processes have explained, this forward-looking orientation allows disputants to agree on future conduct without getting bogged down in the past.²³² The

²²⁶ See, e.g., Ellen E. Deason, *Beyond "Managerial Judges": Appropriate Roles in Settlement*, 78 OHIO ST. L.J. 73, 91 (2017) (stating that by the 1990s, mediation had become the most common form of ADR offered by federal courts); Bobbi McAdoo & Nancy A. Welsh, *Look Before You Leap and Keep on Looking: Lessons from the Institutionalization of Court-Connected Mediation*, 5 NEV. L.J. 399, 412 (2005) (establishing that many surveyed judges believe that mandatory mediation "may actually threaten litigants' rights to substantive justice").

²²⁷ See, e.g., Carrie Menkel-Meadow, *Restorative Justice*, *supra* note 218, at 10.2 ("In its most idealized form, there are four Rs of restorative justice: repair, restore, reconcile, and reintegrate the offenders and victims to each other and to their shared community.").

²²⁸ M. Kay Harris, *Transformative Justice: The Transformation of Restorative Justice*, in HANDBOOK OF RESTORATIVE JUSTICE: A GLOBAL PERSPECTIVE 555, 555 (Dennis Sullivan & Larry Tifft eds., 2006).

²²⁹ Blanca Fromm, *Bringing Settlement Out of the Shadows: Information About Settlement in an Age of Confidentiality*, 48 UCLA L. REV. 663, 664–65 (2001).

²³⁰ The Federal Rules of Criminal Procedure, and similar state rules, in theory require judges to make a factual determination that evidence supports guilt before accepting a guilty plea. See FED. R. CRIM. P. 11(b)(3). However, in some jurisdictions, "a prison sentence [may Constitutionally be imposed] upon an accused who is unwilling expressly to admit his guilt but who, faced with grim alternatives, is willing to waive his trial and accept the sentence." *North Carolina v. Alford*, 400 U.S. 25, 36 (1970).

²³¹ It is well recognized by experts that innocent defendants may plead guilty "due to the overall coercive atmosphere of plea bargaining." Cynthia Alkon, *Hard Bargaining in Plea Bargaining: When Do Prosecutors Cross the Line?*, 17 NEV. L.J. 401, 414 (2017). See also SIMON, *IN DOUBT*, *supra* note 146, at 210 (explaining that the public admission made in a plea bargain does not guarantee the accuracy of the plea, as plea bargains are driven primarily by tactical considerations).

²³² See, e.g., JAMES J. ALFINI, SHARON B. PRESS & JOSEPH B. STULBERG, *MEDIATION THEORY AND PRACTICE* 125 (3d ed. 2013) (suggesting that mediators "remind parties that they cannot change what happened in the past, but they can decide how they want things to be in the future"); Carrie J. Menkel-Meadow, *Remembrance of Things Past? The Relationship of Past to Future in Pursuing Justice in Mediation*, 5 CARDOZO J. CONFLICT RESOL. 97, 98 (2004) (observing that one of mediation's "defining characteristics" is that "mediation is not required to deal with the past; it asks the parties to look to their futures and remake their duties and responsibilities toward each other").

divorcing parents need not reach an agreement over who had what affairs or who wasted how much money to reach a settlement on child custody, child support, and other matters. The employee and employer need not come to a common understanding as to whether sexual harassment occurred for them to amicably part ways and agree on a severance package. The company can pay an injured person without conceding liability.

Moreover, to the extent that non-adjudicatory processes do focus on the past, third-party neutrals and others involved in these processes tend to recognize that one's view of truth depends on one's perspective.²³³ For example, when disputants in a mediation make claims to truth, mediators may well encourage them to appreciate that while they have their opinion, others may see the world differently.²³⁴ For this reason, dispute resolution scholar Carrie Menkel-Meadow explains that negotiation and mediation can be seen as postmodernist, in that they can "permit[] several realities to 'co-exist'" and "enable relevant parties to 'mediate' their own stories and realities of the past."²³⁵ She further states:

I suggest the heretical notion that the adversary system may no longer be the best method for our legal system to deal with all of the matters that come within its purview. If late-twentieth century learning has taught us anything, it is that truth is illusive, partial, interpretable, dependent on the characteristics of the knowers as well as the known, and, most importantly, complex. . . . The binary nature of the adversary system and its particular methods and tactics often may thwart some of the essential goals of any legal system.²³⁶

A second important way that non-adjudicatory processes differ from adjudicatory processes in their approach to justice is that they may view problems and disputes more broadly. Rather than focus primarily on legal rights and remedies, processes such as negotiation and mediation often look

²³³ See, e.g., Menkel-Meadow, *The Trouble with the Adversary System*, *supra* note 147, at 5–6 (critiquing "[t]he binary nature of the adversarial system").

²³⁴ David A. Hoffman & Richard N. Wolman, *The Psychology of Mediation*, 14 CARDOZO J. CONFLICT RESOL. 759, 765, 769–70, 801 (2013) (discussing how mediators can help disputants appreciate that they are interpreting the same events in different ways). Cf. James R. Coben, *Barnacles, Aristocracy and Truth Denial: Three Not So Beautiful Aspects of Contemporary Mediation*, 16 CARDOZO J. CONFLICT RESOL. 779, 781–82, 800–05 (2014) (expressing discomfort with the post-modernist views of mediation).

²³⁵ Menkel-Meadow, *Remembrance of Things Past?*, *supra* note 232, at 104.

²³⁶ Menkel-Meadow, *The Trouble with the Adversary System*, *supra* note 147, at 5–6 (arguing that the adversary system is an "inadequate" and even "dangerous" method for satisfying important dispute resolution goals, and that "[b]inary, oppositional presentations of facts in dispute are not the best way for us to learn the truth").

at disputants' interests, problems, and goals.²³⁷ This broadening can potentially help individuals and communities heal their rifts.²³⁸ Thus, in the criminal context, a broader approach might consider a defendant's education, mental and physical health, and employment options.²³⁹ Examination of such factors might lead a justice system to emphasize reparations, apologies, or education over incarceration. Civilly, the broader approach might look at whether disputants wish to have a future personal or business relationship, whether disputants have non-monetary interests that might be used to forge a future agreement, or whether an apology might be meaningful to the disputants. When such factors are considered, sometimes disputant businesses or individuals can craft creative agreements that serve their interests more effectively than a court might decree.²⁴⁰

III. HOW OUR NEW TECHNOLOGY CAN HELP US THINK MORE CLEARLY ABOUT WHAT WE SHOULD SEEK IN A SYSTEM OF JUSTICE

With these broader goals in mind, we now return to the original question: how should we integrate our powerful new technology into our system of justice? We have seen that this technology may help us get to some truth, but that due to technical limits and our human psyches, we cannot realistically expect any technology to bring us truthful answers to all of our questions. We have also seen that while truth is relevant to justice, justice is far bigger than truth. How, then, should we design our justice system to best take account of the truth-finding capabilities of our new technology while

²³⁷ See, e.g., Leonard L. Riskin, *Understanding Mediators' Orientations, Strategies, and Techniques: A Grid for the Perplexed*, 1 HARV. NEGOT. L. REV. 7, 14, 17–18 (1996) (explaining that mediators can encourage parties to approach disputes from either a broad or narrow perspective, and that mediators can also help disputants work towards resolution by either offering evaluations or instead merely facilitating disputants' own discussions and insights).

²³⁸ See, e.g., Lela P. Love, *Images of Justice*, 1 PEPP. DISP. RESOL. L.J. 29, 29–32 (2000) (describing, in artistic terms, the core distinctions between images of litigation, mediation, and arbitration); Carrie Menkel-Meadow, *From Legal Disputes to Conflict Resolution and Human Problem Solving: Legal Dispute Resolution in a Multidisciplinary Context*, 54 J. LEGAL EDUC. 7, 18 (2004) (“Legal problem solving is not just about adversarial argument or persuasion about what is ‘right’ for the client; it is about understanding a range of possible goals for clients and those with whom they interact, and seeking both substantive outcomes and appropriate processes to satisfy the needs and interests of clients and those engaged in activity with the client.”).

²³⁹ This broader approach is the premise of today's “problem-solving courts.” See PAMELA M. CASEY & DAVID B. ROTTMAN, NAT'L CTR. FOR STATE COURTS, PROBLEM-SOLVING COURTS: MODELS AND TRENDS 1 (2003), https://www.ncsc.org/~media/Files/PDF/Publications/Justice%20System%20Journal/PROBLEM-SOLVING_COURTS_Models_and_Trends.ashx (providing an overview of problem-solving courts developed “in response to frustration by both the court system and the public to the large numbers of cases that seemed to be disposed repeatedly but not resolved”).

²⁴⁰ Some of the classic U.S. dispute resolution literature espousing this approach includes ROGER FISHER & WILLIAM URY, GETTING TO YES: NEGOTIATING AGREEMENT WITHOUT GIVING IN (Bruce Patton ed., 3d ed. 2011) and Carrie Menkel-Meadow, *Toward Another View of Legal Negotiation: The Structure of Problem Solving*, 31 UCLA L. REV. 754 (1984).

also serving our greater interests in justice? While I do not purport to have all the answers, I am certain it is critically important to systematically anticipate how best to incorporate our new technology into our systems of dispute resolution.²⁴¹ As one commentator put it: “[T]he accelerating technological tsunami is a Pandora’s box likely to eclipse all other influences on human interaction, for good and for ill.”²⁴² Thus, I see this Article as the beginning of an extremely important brainstorming session.²⁴³

As we engage in this mental exercise, I propose two preliminary ideas. First, I do not think we should aim to devise a single form of dispute resolution, but rather suggest that we should look for multiple processes that, together, can comprise a just system of dispute resolution. Like others in my field, I believe in “process pluralism,” the idea that no single process is best for all circumstances.²⁴⁴ Multiple processes are likely also essential to take account of the fact that we have no single conception of justice. Second, I urge that we allow ourselves to think broadly and creatively about our systems of justice, without worrying about current legal rules and limits. I realize, of course, that the U.S. Constitution sets significant constraints for how our dispute resolution systems might be redesigned. The Sixth and Seventh Amendments, for example, require that a jury trial be afforded in many criminal and civil cases.²⁴⁵ Yet, while I have sometimes fiercely defended the right to a civil jury trial,²⁴⁶ I suggest we try to think about how our new technology should impact our dispute resolution systems from purely a policy perspective, and leave to another day the question of what is possible under our existing Constitution. In theory, at least, we might want to amend the Constitution. Conceivably, a form of dispute resolution that made sense hundreds of years ago, when disputes were resolved based on personal observations and live witness testimony, will no longer be the most

²⁴¹ Many years ago, Chief Justice Warren E. Burger used the term “systematic anticipation” to encourage us to rethink how best to design our justice system. *See generally* Warren E. Burger, *Agenda for 2000 A.D.—Need for Systematic Anticipation*, 15 JUDGES’ J. 27 (1976) (providing the keynote address at the National Conference on the Causes of Popular Dissatisfaction with the Administration of Justice, also known as the “Pound Conference”).

²⁴² Thomas J. Stipanowich, *Living the Dream of ADR: Reflections on Four Decades of the Quiet Revolution in Dispute Resolution*, 18 CARDOZO J. CONFLICT RESOL. 513, 514 (2017).

²⁴³ While brainstorming is generally thought of as a group activity, recent psychological research shows that creativity is enhanced when group members first search for solutions individually, lest their ideas be squelched by group behaviors. *See, e.g.*, Art Markman, *Your Team is Brainstorming All Wrong*, HARV. BUS. REV. (May 18, 2017), <https://hbr.org/2017/05/your-team-is-brainstorming-all-wrong> (discussing brainstorming techniques that “allow individual work during divergent phases of creativity and group work during convergent phases”).

²⁴⁴ *See, e.g.*, Carrie Menkel-Meadow, *Peace and Justice: Notes on the Evolution and Purposes of Legal Processes*, 94 GEO. L.J. 553, 554–55 (2006) (explaining “process pluralism”).

²⁴⁵ U.S. CONST. amends. VI, VII.

²⁴⁶ *See, e.g.*, Jean R. Sternlight, *Mandatory Binding Arbitration and the Demise of the Seventh Amendment Right to a Jury Trial*, 16 OHIO ST. J. DISP. RESOL. 669, 669–733 (2001) (discussing jury trial rights under the Seventh Amendment).

appropriate means to resolve disputes in our brave new era of sophisticated technology.

Moving on from these preliminaries, I further suggest that we consider three primary issues as we ponder what forms of dispute resolution will best serve justice in our new era of technology-assisted dispute resolution: (1) what forms of dispute resolution may help us resolve technical issues that will inevitably arise; (2) what forms of dispute resolution may help us deal with human psychology that causes people to react differently than one another to given technological data; and (3) what forms of dispute resolution will help us think more clearly about issues other than truth—that is how best to handle situations once we know the truth of what happened.

A. *Resolving Technical Issues*

As our evidence becomes increasingly scientific, we need to devise ways to better integrate competent technical analysis into our dispute resolution. In part, this requires us to look again at an issue that we have been considering for over a hundred years: do judges and juries have sufficient ability to understand and evaluate scientific evidence, and if not, what reforms should be made?²⁴⁷ Jurors' forte was once their knowledge of the community.²⁴⁸ We later relied on jurors' supposed common sense and purported ability to determine witness veracity.²⁴⁹ Judges are trained in interpreting the law. But neither judges nor jurors typically have scientific training that will help them resolve such questions as whether the DNA matches, whether the geo-location data is reliable, or whether a video has been faked.²⁵⁰ Nor am I convinced that an inquisitorial system is inherently

²⁴⁷ See *Parke-Davis & Co. v. H.K. Mulford Co.*, 189 F. 95, 115 (S.D.N.Y. 1911) (Learned Hand, J.) (“How long we shall continue to blunder along without the aid of unpartisan and authoritative scientific assistance in the administration of justice, no one knows; but all fair persons not conventionalized by provincial legal habits of mind ought, I should think, unite to effect some such advance.”); see also Scott Brewer, *Scientific Expert Testimony and Intellectual Due Process*, 107 YALE L.J. 1535, 1539 (1998) (arguing that because judges and juries generally lack “epistemic” competence their decisions often fail to provide “intellectual due process”); Learned Hand, *Historical and Practical Considerations Regarding Expert Testimony*, 15 HARV. L. REV. 40, 40 (1901) (“No one will deny that the law should in some way effectively use expert knowledge wherever it will aid in settling disputes. The only question is as to how it can do so best.”). See generally TAL GOLAN, *LAW OF MEN AND LAWS OF NATURE: THE HISTORY OF SCIENTIFIC EXPERT TESTIMONY IN ENGLAND AND AMERICA* 6 (2007) (discussing the difficulties in early adaptations of experts in the adversarial environment).

²⁴⁸ See OLDHAM, *supra* note 15, at 2–3 (describing how, in the “early era of the jury in England,” “the jurors came from the neighborhood, and some of them, at least, were expected to know or to find out the facts of the dispute in litigation”).

²⁴⁹ See, e.g., Steven I. Friedland, *On Common Sense and the Evaluation of Witness Credibility*, 40 CASE W. RES. L. REV. 165, 169 (1989) (drawing on psychology to critique jurors' supposed common sensibility to evaluate witness credibility).

²⁵⁰ While some may assume that judges would at least be more scientifically competent than jurors, this is not necessarily so. See Brewer, *supra* note 247, at 1677–78.

better suited to resolve technical issues than is an adversarial process.²⁵¹ The fundamental problem, as Professor Scott Brewer explained twenty years ago, is that it is increasingly unlikely that “one and the same decisionmaker has both legal legitimacy . . . and epistemic competence with the basic formal tools of scientific analysis.”²⁵² As we become increasingly focused on technology and as this technology advances and covers a broad array of fields, it will be increasingly difficult or more likely impossible to find individuals who possess both sets of expertise.²⁵³ Realistically, not even the same scientist—much less the same scientist/judge—would have the expertise to assess DNA, brain scans, and video evidence.²⁵⁴

To date in the United States, we have primarily relied on dueling expert witnesses to help judges and juries evaluate technical evidence.²⁵⁵ While we can tell ourselves that this works, and it does to some degree, many have questioned whether this is the best means to evaluate scientific evidence.²⁵⁶ First, even with the help of experts, untrained judges and juries may not be

²⁵¹ Cf. Sevier, *A [Relational] Theory of Procedure*, *supra* note 14, at 5–6.

²⁵² Brewer, *supra* note 247, at 1677 (suggesting four possible ways of achieving a “two-hat solution”: (1) sending decisions currently made in private litigation to public agencies staffed by scientists; (2) using “blue ribbon scientifically trained juries”; (3) relying on “scientific expert magistrate judges”; or (4) sending certain matters to “science courts staffed by scientifically trained judges”).

²⁵³ See, e.g., Edward K. Cheng & Albert H. Yoon, *Does Frye or Daubert Matter? A Study of Scientific Admissibility Standards*, 91 VA. L. REV. 471, 498 (2005) (discussing the “vanishingly small effect” *Daubert* standards have on the removal rate); Jennifer L. Groscup et al., *The Effects of Daubert on the Admissibility of Expert Testimony in State and Federal Criminal Cases*, 8 PSYCHOL. PUB. POL’Y & L. 339, 339 (2002) (“Scientific and technical advances are being made daily; therefore, keeping up to date on all, or even most, of these advancements is nearly impossible.”).

²⁵⁴ Proposals have, however, been made that might at least aid judicial and juror comprehension of scientific evidence. See, e.g., Valerie P. Hans, *Judges, Juries, and Scientific Evidence*, 16 J.L. & POL’Y 19, 40–41 (2007) (describing “the use of juror note-taking, the use of jury notebooks in appropriate cases, the careful consideration of using juror questions, and the option of allowing jurors to discuss evidence as the case proceeds rather than waiting for the final deliberations”); N.J. Schweitzer & Michael J. Saks, *Jurors and Scientific Causation: What Don’t They Know, and What Can Be Done About It?*, 52 JURIMETRICS 433, 433 (2012) (training jurors to be better “consumers” of evidence through an “educational intervention”). See also Melissa Whitney, *How to Improve Technical Expertise for Judges in AI-related Litigation*, BROOKINGS (Nov. 7, 2019), <https://www.brookings.edu/research/how-to-improve-technical-expertise-for-judges-in-ai-related-litigation/> (summarizing Brookings Institution report on improving judges’ technical expertise).

²⁵⁵ For an examination of how judges apply current case law regarding the admissibility of scientific evidence, see DAVID L. FAIGMAN ET AL., *MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY* (2018).

²⁵⁶ See, e.g., Jennifer L. Mnookin, *Expert Evidence, Partisanship, and Epistemic Competence*, 73 BROOK. L. REV. 1009, 1010 (2008) (observing that “a century’s worth of writing about expert evidence circles around the same themes and consistently reaches the same conclusion: that the use of party-selected expert witnesses in an adversarial legal system is fraught with difficulties”). See also Lora M. Levett & Margaret Bull Kovera, *The Effectiveness of Opposing Expert Witnesses for Educating Jurors About Unreliable Expert Evidence*, 32 L. & HUM. BEHAV. 363, 372 (2008) (finding adversarial model does not effectively educate jurors about strengths and weaknesses of expert testimony, instead tending to make jurors skeptical about all expert testimony).

able to make good technical determinations.²⁵⁷ In a battle of experts, judge or jury may be swayed by charisma or fall prey to the mistakes of a well-meaning expert.²⁵⁸ Second, wealthier parties will be advantaged in hiring technical experts.²⁵⁹ In the criminal setting, this disparity will often favor the prosecution, as indigent, poor, or even middle class defendants often will not be able to hire experts to challenge the prosecution's evidence.²⁶⁰ In civil cases, a richer party could even potentially manufacture evidence and use it to win a claim against a poorer party, potentially unable to hire the experts necessary to defeat a claim for theft, fraud, or breach of contract. The difficulty in evaluating technical evidence will also impact non-adjudicatory forms of dispute resolution. In the future, we will be negotiating and mediating in the shadow of technical evidence, as well as trial. While the fact that our justice system is impacted by wealth inequalities is not new, these disparities will be significantly heightened with the increasing importance of technical evidence.

As we become more highly dependent on scientific and technical information, it may be appropriate to ask a non-partisan scientific entity to evaluate such information.²⁶¹ Specifically, we might consider having a panel of neutral highly credentialed scientific experts, paid for by tax dollars, charged with examining certain kinds of scientific evidence pertaining to claims brought in a particular jurisdiction.²⁶² These sorts of panels have

²⁵⁷ Many empirical studies examine the competence of both judges and juries to make scientific and technical determinations. The results are mixed, generally showing that judges and juries are neither entirely competent nor entirely incompetent. *See, e.g.*, Hans, *supra* note 254, at 21 (stating that while there are difficulties, most research indicates that juries do reasonably well in understanding complex evidence); Neil Vidmar & Shari Seidman Diamond, *Juries and Expert Evidence*, 66 BROOK. L. REV. 1121, 1146, 1180 (2001) (discussing how jurors' use of evidence and response to various forms of expert evidence differs in each case).

²⁵⁸ *See, e.g.*, James R. Dillon, *Expertise on Trial*, 19 COLUM. SCI. & TECH. L. REV. 247, 266–67 (2018) (stating that “[d]ecision makers who lack the ability to engage with the substance of an expert disagreement must fall back on heuristic shortcuts,” such as the demeanor and credentials of the testifying expert).

²⁵⁹ *See* David Medine, *The Constitutional Right to Expert Assistance for Indigents in Civil Cases*, 41 HASTINGS L.J. 281, 281 (1990) (discussing that “[t]he ability to obtain an expert witness can be a decisive factor in civil litigation,” meaning indigent civil litigants are at a disadvantage).

²⁶⁰ *See* Findley, *Innocents at Risk*, *supra* note 135, at 898–902 (describing the accused's “disadvantage by lack of access to crime scene evidence and investigative resources”). Occasionally this economic disparity will favor a wealthy criminal defendant, such as O.J. Simpson, who was able to hire a “dream team” of attorneys to dispute the government's double murder case against him. It is estimated that O.J.'s “dream team” cost him \$50,000 a day. Jason Guerrasio, *How O.J. Simpson Paid for the ‘Dream Team’ of Lawyers on His Murder Trial*, BUS. INSIDER (June 19, 2016, 2:27 PM), <https://www.businessinsider.com/how-oj-simpson-paid-for-the-dream-team-2016-6>.

²⁶¹ For a discussion of the use of expert panels in the administrative law context, see Adrian Vermeule, *The Parliament of the Experts*, 58 DUKE L.J. 2231 (2009).

²⁶² *See* Dillon, *supra* note 258, at 252 (suggesting creation of “an administrative office staffed by individuals with expertise in a range of scientific domains that most commonly arise in litigation” who might be granted authority to decide legal questions requiring scientific judgment). *Cf.* Nancy J. Brekke et al., *Of Juries and Court-Appointed Experts: The Impact of Nonadversarial Versus Adversarial Expert*

already been considered in other contexts, such as mass torts.²⁶³ There could be many versions of such an idea, with variations as to how many panel members should be consulted and the kinds of issues panel members should consider. Such an expert panel might for example make general determinations that certain tests (such as polygraphs) could never or might sometimes be relied upon in a legal setting.²⁶⁴ In specific cases, such a panel might also opine on whether a particular technical finding based on DNA, fingerprint analysis, or video was sufficiently reliable in that instance. With respect to the interaction between panel and legal expertise, such panel determinations might be either evidence to be considered by a judge or jury, or perhaps even final rulings in some situations.

The idea of having scientific issues resolved by a governmental panel has its roots in prior proposals that would appoint a single non-partisan expert to assist jurors and judges in their deliberations.²⁶⁵ The Federal Rules of Evidence already permit judges to appoint such experts, and they sometimes do so.²⁶⁶ Along similar lines, judges sometimes appoint special masters who have scientific training to help resolve technical evidentiary or similar issues.²⁶⁷ However, the panel I am suggesting would potentially go further than these proposals, perhaps finally resolving certain technical issues rather than merely offering testimony to a jury, judge, or other decisionmaker.

Admittedly, the idea of government panels is not a perfect solution and, as noted, many details regarding cost, neutrality, probabilistic parameters, and jurisdiction would need to be worked out.²⁶⁸ Yet, while the problems with the proposal are evident, the growing importance of technical evidence will force us to consider this or similar options. It will be increasingly

Testimony, 15 L. & HUM. BEHAV. 451, 451 (1991) (finding that jurors pay more attention to battling adversarial experts than to a single court-appointed expert).

²⁶³ See, e.g., Troyen A. Brennan, *Would a Federal Judicial Science Board Improve Toxic Tort Litigation?*, 17 AM. J. INDUS. MED. 761, 762 (1990) (considering the benefit of installing a Federal Judicial Science Board to deal with experts in toxic tort litigation).

²⁶⁴ Such a panel might essentially be charged with making the “reliability” portion of the determination required by the Supreme Court in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 592–95 (1993). See also FED. R. EVID. 702 (providing in part that expert testimony must be “the product of reliable principles and methods”).

²⁶⁵ See Learned Hand, *Historical and Practical Considerations Regarding Expert Testimony*, 15 HARV. L. REV. 40, 56 (1901) (suggesting a new way to present expert testimony). See also Jennifer L. Mnookin, *Idealizing Science and Demonizing Experts: An Intellectual History of Expert Evidence*, 52 VILL. L. REV. 763 (2007) (analyzing the role and reliability of experts).

²⁶⁶ FED. R. EVID. 706. For a discussion of the creation of a special panel of experts to consider scientific claims pertaining to silicone breast implants, see NAT’L RESEARCH COUNCIL, A CONVERGENCE OF SCIENCE AND LAW: A SUMMARY REPORT OF THE FIRST MEETING OF THE SCIENCE, TECHNOLOGY, AND LAW PANEL 5–8 (2001).

²⁶⁷ See NAT’L RESEARCH COUNCIL, *supra* note 266, at 7; Hans, *supra* note 254, at 20.

²⁶⁸ For other issues to be resolved, see *supra* text accompanying note 261–267.

infeasible and unfair to simply rely on lay persons, whether jurors or judges, to decide complex scientific issues, even with the help of expert witnesses.

At the same time, while determining the technical validity of potential evidence will be tough, this is only one of several problems to be considered—and is really the easiest one. We now turn our attention to the harder issues.

B. *Dealing with Multiple Interpretations*

Even assuming that our new technology provides information that is genuine and accurate, we know that interpretive issues will often remain.²⁶⁹ We have seen that technology does not speak for itself but rather is interpreted by human investigators, attorneys, disputants, jurors, and judges, based on their prior experiences and knowledge.²⁷⁰ While we each typically believe that our own interpretation is obvious and right, research shows that others may interpret the same evidence quite differently and be equally sure they are right.

One of our existing forms of dispute resolution, the jury trial, might seem ideal to handle the fact that the same evidence may be viewed and interpreted differently by different people.²⁷¹ While juries may not be particularly adept at analyzing technical evidence, it is frequently assumed they would be fairly well suited to providing diverse interpretations on videos, pictures, or other pieces of technical evidence. Juries are at least supposed to provide diversity from the community.²⁷² It seems logical that a group of twelve or even six community members,²⁷³ required to deliberate with one another,²⁷⁴ might help each other see that their individual

²⁶⁹ Note that there may be an interaction between scientific incompetence and psychological preconceptions or biases. See Dillon, *supra* note 258, at 266–67 (“Decision makers who lack the ability to engage with the substance of an expert disagreement must fall back on heuristic shortcuts to reach a decision; in so doing, they open the door for implicit (or at times explicit) biases to affect the process.”).

²⁷⁰ See *supra* text accompanying note 163.

²⁷¹ See Francis X. Flanagan, *Race, Gender, and Juries: Evidence from North Carolina*, 61 J.L. & ECON. 189, 212 (2018) (concluding that the race and gender composition of the jury pool significantly impacts the likelihood of conviction).

²⁷² Francis X. Flanagan, *Peremptory Challenges and Jury Selection*, 58 J.L. & ECON. 385, 395 (2015) (finding that lawyers’ exercise of peremptory challenges tends to make juries more homogenous). See Hans Zeisel & Shari S. Diamond, *The Effect of Peremptory Challenges on Jury and Verdict: An Experiment in a Federal District Court*, 30 STAN. L. REV. 491, 531 (1978) (concluding that voir dire process leads to different results in some cases).

²⁷³ *Williams v. Florida*, 399 U.S. 78, 86 (1970) (finding the use of six-person juries in criminal cases to be constitutionally permissible).

²⁷⁴ See generally DENNIS J. DEVINE, *JURY DECISION MAKING: THE STATE OF THE SCIENCE* 152–80 (2012) (collecting social science on the impact of deliberation in contrast to allowing jurors to reach independent conclusions); SIMON, *IN DOUBT*, *supra* note 146, at 197–202 (discussing the effects of jury deliberation).

interpretations are subject to challenge.²⁷⁵ Jury researchers Neil Vidmar and Valerie Hans state: “The idea of a representative jury is a compelling one. A jury of people with a wide range of backgrounds, life experiences, and world knowledge will promote accurate fact-finding”²⁷⁶ Certainly the hope is that as jurors deliberate, they will help one another get beyond their improper biases and set aside incorrect information.²⁷⁷

In fact, however, psychological research is quite mixed on the extent to which jury deliberation can cure or even ameliorate preconceptions and biases.²⁷⁸ Dennis J. Devine, who has studied this issue for many years, explains:

On one hand, deliberation could cause jurors to examine the evidence more actively and critically, increasing the chance that juries arrive at the “correct” decision in relation to their constituent members. According to this view, the biases and prejudices of individual members will tend to cancel out during deliberation. On the other hand, deliberation could potentially make matters worse, amplifying and propagating the biases of their members.²⁷⁹

That is, while jurors with disparate perspectives can potentially help one another see evidence through different lenses,²⁸⁰ aspects of individual psychology and group decision making sometimes cause amplification rather than diminution of individual biases as jurors try to convince one another their views are correct.²⁸¹ Devine and others conclude that the

²⁷⁵ DEVINE, *supra* note 274, at 179–80 (discussing many ways in which deliberation can impact jury decision making); SIMON, IN DOUBT, *supra* note 146, at 198 (stating deliberative jury decisions are not necessarily either better or worse than decisions made by individual jurors).

²⁷⁶ NEIL VIDMAR & VALERIE P. HANS, AMERICAN JURIES 74 (2007).

²⁷⁷ DEVINE, *supra* note 274, at 179.

²⁷⁸ *Id.* This same ambiguity affects many different kinds of groups—from boards of directors to community groups to law faculties. See CASS R. SUNSTEIN & REID HASTIE, WISER: GETTING BEYOND GROUPTHINK TO MAKE GROUPS SMARTER 2 (2014) (“Do groups usually correct individual mistakes? Our simple answer is that they do not. Far too often, groups actually amplify those mistakes. With respect to the planning fallacy, for example, groups turn out to be even worse than individuals are—which is a clue to a lot of failures in business, government, and daily life.”).

²⁷⁹ DEVINE, *supra* note 274, at 177–78. See also Shari Seidman Diamond & Mary R. Rose, *The Contemporary American Jury*, 14 ANN. REV. L. & SOC. SCI. 239 (2018) (advocating more research into the jury decision making process).

²⁸⁰ See, e.g., Samuel R. Sommers, *On Racial Diversity and Group Decision Making: Identifying Multiple Effects of Racial Composition on Jury Deliberations*, 90 J. PERSONALITY & SOC. PSYCHOL. 597, 597 (2006) (reporting that racially diverse juries exchanged more information than all-white juries and were more amenable to discussions of racism). See also Anita Woolley & Thomas W. Malone, *Defend Your Research: What Makes a Team Smarter? More Women*, HARV. BUS. REV. (June 2011), <https://hbr.org/2011/06/defend-your-research-what-makes-a-team-smarter-more-women> (discussing the impact women have in groupthink).

²⁸¹ See, e.g., Sara Gordon, *All Together Now: Using Principles of Group Dynamics to Train Better Jurors*, 48 IND. L. REV. 415, 440–48 (2015) (reporting that group conformity, free riding, and social

determinants of whether individual biases are diminished or enhanced are factors such as the strength of the evidence and the distribution of bias/preconception amongst the jurors.²⁸² While it is conceivable that jurors might be trained to get beyond some of the impediments to good deliberation,²⁸³ this approach has not been empirically validated and could be difficult to implement.²⁸⁴ In short, juries are no panacea in terms of incorporating multiple perspectives. Perhaps we might come up with other approaches that would do as well or better at securing community input that might ameliorate inappropriate biases.

In the criminal law context, grand juries have historically provided an opportunity for prosecutors to gain input from a broader segment of the community before bringing charges.²⁸⁵ Pursuant to this practice, which is used in federal courts for felonies and also in about half the states,²⁸⁶ a group of roughly twenty citizens is asked to opine on whether probable cause exists to bring charges against a particular person or entity.²⁸⁷ Admittedly, in our current system, the grand jury seems to provide little check on prosecutors, as it is often joked that a grand jury would even indict a ham sandwich if the prosecutor asked it to do so.²⁸⁸ Yet, despite the practical limits to the existing grand jury process, in theory, at least, a mechanism akin to the grand jury

loading may undermine jurors' willingness or ability to challenge others' views); Christine L. Ruva & Christina C. Guenther, *Keep Your Bias to Yourself: How Deliberating With Differently Biased Others Affects Mock-Jurors' Guilt Decisions, Perceptions of the Defendant, Memories and Evidence Interpretation*, 41 L. & HUM. BEHAV. 478, 479 (2017) (explaining that group polarization may lead jurors with different views to anchor into those views more deeply if confronted by another perspective).

²⁸² See DEVINE, *supra* note 274, at 179 (noting that groups tend to be better at incorporating members' views in extreme cases, when evidence is generally very strong or very weak, but in more moderate or ambiguous cases the deliberation process may exacerbate differences among jurors or biases).

²⁸³ See, e.g., Gordon, *supra* note 281, at 423–24 (advocating that juries be trained in group dynamics).

²⁸⁴ That is, it would likely be time consuming and expensive.

²⁸⁵ See generally GRAND JURY 2.0: MODERN PERSPECTIVES ON THE GRAND JURY (Roger Anthony Fairfax, Jr. ed., 2010) (outlining historical practices of grand juries and arguing for new approaches to help deter mass incarceration).

²⁸⁶ SARA SUN BEALE ET AL., GRAND JURY LAW AND PRACTICE § 8:2 (2018).

²⁸⁷ See Roger A. Fairfax Jr., *The Grand Jury's Role in the Prosecution of Unjustified Police Killings – Challenges and Solutions*, 52 HARV. C.R.-C.L. L. REV. 397, 401–03 (2017). See generally Niki Kuckes, *Retelling Grand Jury History*, in GRAND JURY 2.0: MODERN PERSPECTIVES ON THE GRAND JURY 125 (Roger Anthony Fairfax, Jr. ed., 2010) (disputing Supreme Court's description of grand jury history).

²⁸⁸ Grand juries are presumably compliant because they only hear the prosecutor's side of the case, and not the potential defendant's. Some have suggested we reform the current grand jury system by appointing counsel who could provide independent guidance to the grand jury members. See Fairfax Jr., *supra* note 287, at 414, 417 (explaining "independent prosecutor" models). See also Ric Simmons, *The Role of the Prosecutor and the Grand Jury in Police Use of Deadly Force Cases: Restoring the Grand Jury To Its Original Purpose*, 65 CLEV. ST. L. REV. 519, 520–23 (2017) (explaining that grand juries' compliance is attributable in part to the Supreme Court decisions refusing to apply hearsay or other evidentiary exclusions in the grand jury setting).

could allow much needed community²⁸⁹ input to check a prosecutor's reading of scientific evidence.²⁹⁰ A true cross-section of the community might offer an alternative interpretation of a photo or video, or even of bacterial, DNA, or brainwave evidence. For this reason, while not focusing on scientific evidence, multiple commentators have already suggested that we place greater emphasis on the grand jury process in order to rein in prosecutorial discretion.²⁹¹ While grand jury members will no doubt have their own predispositions and biases, prosecutors could at least learn that their own perspectives are not universal.²⁹² That is, community members with different racial, ethnic, or political backgrounds, or simply persons who are not members of a law enforcement community, might take a fresh look at a video, pictures, fingerprints, brain scans, or similar evidence. Of course, to avoid the ham sandwich problem we would need to reform current practice to provide the grand jury with greater independence from the prosecutor than currently exists.²⁹³ But the idea of having early independent community review of technical evidence may be worth pursuing. Indeed, perhaps there might be a way to solicit community input on technical evidence such as videos or photos in civil as well as criminal cases.

In this modern age, there may also be other better ways than a traditional jury or grand jury to gain insights that might lessen biases and preconceptions affecting the interpretation of technical evidence. Specifically, we might use the internet to ask persons from different classes, races, genders, political parties, and so on to opine on the meaning of a photo, video, or even DNA evidence.²⁹⁴ With the internet, we need not rely

²⁸⁹ As others have observed, the relevant "community" could be defined in multiple ways. *See, e.g.*, Adriaan Lanni, *Implementing the Neighborhood Grand Jury*, in *GRAND JURY 2.0: MODERN PERSPECTIVES ON THE GRAND JURY* 171, 172–73 (Roger Anthony Fairfax, Jr. ed., 2010) (explaining the "neighborhood grand jury" model wherein local community members play an active role in prosecutorial charging decisions).

²⁹⁰ Of course, this might be a good idea for other evidence too.

²⁹¹ *See, e.g.*, Lanni, *supra* note 289, at 171 (explaining the prosecutor's potentially overbroad power); Kevin K. Washburn, *Restoring the Grand Jury*, in *GRAND JURY 2.0: MODERN PERSPECTIVES ON THE GRAND JURY* 253–55 (Roger Anthony Fairfax, Jr. ed., 2010) (criticizing the lack of attention grand juries and their biases receive).

²⁹² *See* Fairfax Jr., *supra* note 287, at 404 (explaining the basis for grand juror biases driving decision making).

²⁹³ *See id.* at 416 ("Perhaps the most important factor related to the grand jury's effectiveness . . . is the real or perceived lack of independence of the prosecutor who is tasked with investigating and bringing charges . . .").

²⁹⁴ *See* Samuel D. Gosling & Winter Mason, *Internet Research in Psychology*, 66 ANN. REV. PSYCHOL. 877, 878 (2015) (noting the ease with which various media can be incorporated into studies done through the internet); *see also* Michael Buhrmester et al., *Amazon's Mechanical Turk: A New Source of Inexpensive, Yet High-Quality, Data?*, 6 PERSP. ON PSYCHOL. SCI. 3, 3 (2011) (describing an online platform employing a diverse workforce representing more than 100 countries); Scott Plous, *Online Social Psychology Studies*, SOC. PSYCHOL. NETWORK, <https://www.socialpsychology.org/expts.htm> (last visited Jan. 25, 2019) (collecting web-based experiments and surveys).

on the purported randomness of jury selection and voir dire to hope that we get a good cross-section of the community, but rather can even target particular populations and solicit their views.²⁹⁵ Admittedly, no research tool is perfect. Anyone who relies on the internet will for example want to consider whether certain populations lack access to the internet, and whether the anonymity of the internet may cause responders to be sloppy or even prevaricate. However, those who have looked at these issues are generally quite pleased with the internet's potential as a research tool.²⁹⁶ This idea, of drawing broadly on the perspective of the citizenry, resembles the concept of the "citizens' jury" that is sometimes being used in the United States and around the world to solicit input on public policy issues.²⁹⁷

Logistically, how might these or other ideas be implemented to solicit peoples' disparate views on technological data? In the criminal context, it is fairly easy to imagine that police or prosecutors might solicit alternative interpretations of photos, videos, or other potential evidence, whether through a version of grand juries or perhaps using the internet. While some might suggest that prosecutors would never do this, because they only want to interpret evidence in order to secure convictions, perhaps this is overly cynical. First, it is well known and often stated that prosecutors' duty is to serve justice, not merely to obtain convictions.²⁹⁸ This is sometimes more than baloney. Recently, a few prosecutors in major jurisdictions have announced that they are seeking progressive reforms.²⁹⁹ Second, even those prosecutors who are geared to obtain convictions whenever possible have an interest in understanding how evidence will be interpreted by jurors or other finders of fact. It does not serve such prosecutors' interest to rely on particular evidence to support a conviction if, in the end, many viewers will see it as non-incriminating.

On the civil side, lawyers or disputants themselves may want to get an early read on how their technical evidence might be viewed by a judge or

²⁹⁵ See, e.g., Gosling & Mason, *supra* note 294, at 890–91 (explaining the benefits and uses of targeting populations for data collection through the internet).

²⁹⁶ See, e.g., *id.* at 892–93 (explaining the potential for misrepresentation based on certain classes' lack of access to the internet or dishonesty of internet users).

²⁹⁷ See, e.g., Rob D. Fish et al., *Employing the Citizens' Jury Technique to Elicit Reasoned Public Judgments About Environmental Risk: Insights from an Inquiry into the Governance of Microbial Water Pollution*, 57 J. ENVTL. PLAN. & MGMT. 233, 233 (2014) (explaining the role of a citizens' jury in providing public judgment about environmental policy issues).

²⁹⁸ See, e.g., Bruce A. Green, *Why Should Prosecutors "Seek Justice"?*, 26 FORDHAM URB. L.J. 607, 612–18 (1999) (outlining the historical and current concept of "the duty to seek justice").

²⁹⁹ Philadelphia District Attorney Larry Krasner is one example. Ben Austen, *In Philadelphia, a Progressive D.A. Tests the Power – and Learns the Limits – Of His Office*, N.Y. TIMES MAG. (Oct. 30, 2018), <https://www.nytimes.com/2018/10/30/magazine/larry-krasner-philadelphia-district-attorney-progressive.html>. See also Rebecca McCray, *Brooklyn District Attorney Candidates Spar for Title of 'Most Progressive'*, APPEAL (Aug. 31, 2017), <https://theappeal.org/brooklyn-district-attorney-candidates-spar-for-title-of-most-progressive-fbd600efae6/> (explaining the progressive platforms of candidates for Brooklyn District Attorney).

jury. To some degree, this is already done. Jury consultants provide a broad range of services to attorneys, and sometimes may use the internet to predict how an actual jury would react to the case. For example, a company called DecisionQuest advertises that it uses “[t]he power of the internet” to let attorneys see, at a fairly low cost, how a large and diverse pool of persons might respond to particular arguments or evidence.³⁰⁰ While these companies currently emphasize using surveys based on written fact patterns, it is easy to imagine using them to have internet users opine on particular photos, videos, or other forms of evidence.

Thinking more expansively, might it also be appropriate in this era to *require* our system of justice to solicit a broader range of views in civil and criminal cases? Why depend on, at most, twelve possibly diverse jurors to opine on the meaning of scientific evidence? Further, even assuming diversity among jurors, we have seen that the group decision making process may deter some jurors from expressing their contrary views.³⁰¹ Instead, we could require those disputants who rely on various kinds of scientific evidence to have it vetted by a large group of diverse persons to determine how they view that information. Even if those views were not binding, perhaps they would be relevant to the disputants or to the decisionmakers and help them appreciate others’ perspectives?

While the ideas discussed in this Section are not spelled out in detail, surely it is worth considering these kinds of options as a means to deal with the biases that will be so important in interpreting our new technical evidence?

C. *Justice Beyond Truth*

Ironically, the greatest contribution of our new technology to dispute resolution may be that it helps us focus more on the non-truth aspects of justice. To the extent that our new technology can help us answer basic “what happened” questions,³⁰² we will be able to pay more attention to other aspects of justice. Given that X happened, why did it happen? What do we want to do about it? Should we punish someone? If so, how? Should we seek reparations or compensation? Ask for apologies? Educate our fellow community members? Implement reforms to prevent such problems from

³⁰⁰ DECISIONQUEST, <http://www.decisionquest.com/services/online-jury-research/> (last visited Jan. 25, 2019) (relying on online surveys); *see also* R&D ONLINE SERVICES, https://www.rdss.com/rd_services_online/ (last visited Jan. 25, 2019) (stating that it uses “the immediacy of the Internet” to assess cases in a cost-effective manner). In addition, ejury.com uses the internet to solicit feedback from members of the public in order to help attorneys try to settle their cases. *See* Bryan Edelman, *Using Online Surveys to Conduct Jury Research*, JURY EXPERT (Nov. 29, 2011), <http://www.thejuryexpert.com/2011/11/using-online-surveys-to-conduct-jury-research/> (explaining the use of online surveys in jury research).

³⁰¹ *See supra* text accompanying notes 275–81.

³⁰² While the technology will not find all truths, it will provide some useful information that would not otherwise have been available.

occurring in the future? And, we can focus more on such structural issues as how best to provide procedural justice, educate the community, enforce community norms, ensure appropriate privacy, and resolve disputes efficiently and effectively.

If we seek to focus more on the non-truth aspects of dispute resolution, what form or forms of dispute resolution make most sense in our modern world, where many of us have different perspectives on the appropriate goals of a justice system, and where most members of the society likely have no prior knowledge of the individuals who may have been involved in criminal or civil disputes? Perhaps it is best to rely, as we do with trials, on a system where a legislature passes laws based on beliefs held by at least a majority of the society. These laws both lay out the rules of behavior and provide many of the consequences when rules are broken, leaving fairly little discretion in the hands of factfinders such as judges and juries. Or, once we know who did what to whom, perhaps we should afford more discretion to either individual disputants or communities. And maybe we can devise more accessible processes, in which disputants can more fully tell their stories, and thus feel as if they have received more procedural justice.

While our current trial-centric approach to justice may feel inevitable, in fact it is not. There is no reason to see trials as the necessary endpoint in the evolution of our dispute resolution systems.³⁰³ Trials, certainly, can be a very good form of dispute resolution. In the pre-technology era, they were a reasonably effective way of trying to determine the truth of what happened. They were also a useful way to bring communities together, to share social norms, to vent emotions, and to provide procedural justice. Trials could be provided fairly cheaply and quickly, as well. Equally, however, other forms of dispute resolution (negotiation, mediation, group conferencing, etc.) can also serve many of these interests and others, and sometimes more effectively. Both domestically and also internationally, we are seeing disputants and communities use an array of restorative³⁰⁴ and transformative³⁰⁵ approaches that emphasize remedies including apology, restitution, reconciliation, and institutional reform, rather than focus exclusively on applying law to a narrow problem. Non-trial approaches can be better than trials at healing rifts, achieving broader solutions, and resolving disputes efficiently and effectively. By way of inspiration, here are just a few preliminary ideas as to how we could change our system of justice.

One relatively modest reform might be to provide judges/juries with

³⁰³ Carrie Menkel-Meadow, *Is the Adversary System Really Dead? Dilemmas of Legal Ethics as Legal Institutions and Roles Evolve*, 57 CURRENT LEGAL PROBS. 85, 89 (2004). See also Michael Moffitt, *Pleadings in the Age of Settlement*, 80 IND. L.J. 727, 728 (2005) (observing that civil pleadings, which by their nature look backwards and focus primarily on monetary relief, are not well-structured to help disputants find efficient resolutions to more forward-looking and non-monetary problems).

³⁰⁴ See *supra* note 218.

³⁰⁵ See *supra* note 228.

more discretion to devise “appropriate” remedies—expanding beyond our current focus on prison and monetary damages. That is, rather than have trials primarily examine issues of liability or guilt, which will increasingly be resolved by our new technology, we might also use trials to more carefully consider the “then what” issues—how best to deal with any legal infractions that have occurred. Judges and juries might be asked to look more at underlying issues—why people did the things they did. Armed with such information, judges and juries could be more creative at the remedial stage, for example putting heightened emphasis on apologies, reparations, or community service. Or then again, perhaps such background information would lead judges and juries to want to be more punitive or to employ more public notifications or shaming of perpetrators.³⁰⁶

Alternatively, perhaps we will want to put more emphasis on encouraging disputants to work out their own problems—whether through negotiation, mediation, or other versions of individualized dispute resolution. If trials are less needed to get at truth in our new technological world, perhaps individual disputants are best situated to get at their underlying motivations and to determine how the problems between them should be resolved? As mediation advocates have urged for many years, individuals know themselves best, and processes like mediation can also be used to allow disputants to come to know one another better.³⁰⁷ Unconstrained by the formal rules of court, disputants can explore underlying motivations and rationales and become more informed about how their fellow disputant sees the world. Through these conversations, more creative, just solutions may emerge.³⁰⁸

Or, perhaps our new focus on non-truth aspects of justice might lead us in the opposite direction—to seek more involvement of the larger community in our justice decisions. Similar to how our medieval ancestors chose to publicly discuss the problems of animals and insects eating crops or harming humans,³⁰⁹ and to how the Goddess Athena asked the citizens to weigh in on whether and how Orestes should be punished for killing his

³⁰⁶ Personally, I favor the former over the latter, but that is a subject for a different article.

³⁰⁷ See, e.g., Love, *supra* note 238, at 32 (“Unlike the blindfolded lady, the mediator sees all that is offered unprotected by formal procedure or rules of evidence. Unlike the arbitrator or the judge, the mediator may meet with the parties together or listen to them privately so that each nuance of meaning and each atom of possibility are captured and offered back, in their most palatable form, for the parties.”).

³⁰⁸ See *id.* at 35 (“In this new millennium, we should continue to build novel processes, like the mini-trial, the summary jury trial, neutral experts, non-binding arbitration, medene (mediation combined with early neutral evaluation), arb-med and med-arb, but each new process must have a clear rationale and norms of practice which place it in the constellation of processes offering parties a coherent method of achieving justice.”). See also ROBERT A. BARUCH BUSH & JOSEPH P. FOLGER, *THE PROMISE OF MEDIATION: THE TRANSFORMATIVE APPROACH TO CONFLICT* 119–21 (2005) (advocating “transformative” approach to mediation that can broaden disputants’ perspectives even if no settlement is ultimately reached).

³⁰⁹ See *supra* note 201 and accompanying text.

mother,³¹⁰ we too may want to bring some disputes into the public eye both to educate the public and to seek the community's input. That is, rather than relying so heavily on either judges or juries or on allowing individual disputants to work out their own problems, we could look for ways to obtain broader community participation in dispute resolution. The community might not only play a role in interpreting the technology itself, as has been discussed,³¹¹ but also be called upon to set out societal goals, to analyze disputants' likely motivations, and to help devise appropriate remedies.

If we were to seek greater community involvement, we would need to wrestle with the important conceptual issues regarding what community we are talking about. On the narrow side, perhaps neighbors in local communities are better suited than random jurors or judges to help set out goals, analyze disputants' likely motivations, and figure out appropriate punishments/remedies. Local communities might be defined geographically, but also could be defined in racial, ethnic, religious, or other terms.³¹² On the other hand, we could also consider a very different and broader communitarian type of approach that might solicit a range of opinions from across the country or even the world. If part of our goal is to bring us together and come to more common understandings of justice issues, perhaps that is the route we would want to take.

The internet offers us interesting logistical options if we want to solicit such community participation. For example, rather than rely on old-fashioned jury selection to try to secure a diverse body of twelve decisionmakers, we might use the internet to present legal issues to a much larger and potentially more diverse group of persons. Versions of this crowdsourcing are already being explored. For example, online marketer eBay has developed a system in which disputing buyers and sellers submit their alternative versions of disputes to a panel of "jurors" selected at random from among eBay community members who have applied to help resolve such disputes.³¹³ Other online entities are similarly soliciting feedback from

³¹⁰ See KADRI, *supra* note 197, at 4–5.

³¹¹ See *supra* note 289 and accompanying text.

³¹² See, e.g., Clark Freshman, *Privatizing Same-Sex "Marriage" Through Alternative Dispute Resolution: Community-Enhancing Versus Community-Enabling Mediation*, 44 UCLA L. REV. 1687, 1692–93 (1997) ("A community-enhancing understanding of mediation regards mediation instead as a means of helping individuals order their activities and resolve their disputes consistent with the values of some relevant community."); Michael A. Helfand, *Religious Arbitration and the New Multiculturalism: Negotiating Conflicting Legal Orders*, 86 N.Y.U. L. REV. 1231, 1240–41 (2011) (observing that religious arbitration courts "serve particular religious communities by enabling them to resolve disputes in accordance with their own shared religious values and obligations").

³¹³ See Colin Rule & Chittu Nagarajan, *Leveraging the Wisdom of Crowds: The eBay Community Court and the Future of Online Dispute Resolution*, ACRESOLUTION, Winter 2010, at 5–6 (explaining how Ebay Community Court operates); see also Stipanowich, *supra* note 242, at 545 (same).

members of the public.³¹⁴ And, as previously noted, some trial consultants are already using the internet to get feedback on aspects of their case.³¹⁵

The astute reader will have noticed that the various potential reforms here are in tension with one another and that each potential reform has likely downsides as well as benefits. Yet, while these ideas are in tension, they certainly are not in conflict. We need not resolve all disputes using the same process but rather could use trials for some, mediation for others, and community conversations for yet others. As commentators including this author have asserted, there are significant benefits to a “process pluralism” approach.³¹⁶ We might resolve some disputes in each of these ways and thus will want to consider how best to assign disputes to particular processes. While the issue of which disputes should be assigned to which forum has no simple answer,³¹⁷ it merits our increased attention.

CONCLUSION

We need to focus on how to reform our dispute resolution processes to take account of our exciting new technology. While the technology will not provide us with indisputable information regarding who did what to whom, it will certainly provide us with a great deal more and often better such information than we have had in the past. This Article has suggested that we need to respond to these developments in three important ways: (1) consider what forms of dispute resolution can help us resolve disputes pertaining to the technology itself; (2) consider what forms of dispute resolution can help us deal with human psychology that will inevitably impact our interpretation of technical information; and (3) consider what forms of dispute resolution can best help us move beyond mere truth to greater justice. It may not be obvious what forms of dispute resolution are best to deal with these three issues, but it is clear that we must not assume that the traditional approaches

³¹⁴ See *About PeopleClaim*, PEOPLECLAIM, <https://www.peopleclaim.com/about.aspx> (last visited Sept. 12, 2019) (offering pro se disputants opportunity to receive input on their disputes from third parties, using the internet). See also *Jurors*, EJURY, http://www.ejury.com/jurors_learn_about.html (last visited Sept. 12, 2019) (providing attorneys with an opportunity to get feedback on their case from a panel of at least fifty persons who are each paid five to ten dollars).

³¹⁵ See *supra* text accompanying note 300.

³¹⁶ See Menkel-Meadow, *Peace and Justice*, *supra* note 244, at 555 (“Such values [for process pluralism] include the attempt to achieve peace with justice, choice and self-determination of the individual with care and responsibility for others, and recognition of the harms of the past with hopes for reconciliation in the future.”); Jean R. Sternlight, *In Search of the Best Procedure for Enforcing Employment Discrimination Laws: A Comparative Analysis*, 78 TUL. L. REV. 1401, 1488–89 (2004) (exploring which aspects of employment disputes should be resolved publicly or instead privately).

³¹⁷ See Carrie Menkel-Meadow, *Whose Dispute Is It Anyway?: A Philosophical and Democratic Defense of Settlement (In Some Cases)*, 83 GEO. L.J. 2663, 2694–95 (1995) (stating that while it is impossible to decide, *ex ante*, what disputes should be assigned to what kind of procedural process, it is clear that certain issues are so important that they must be publicly decided); Sternlight, *supra* note 316, at 1488–89 (offering thoughts on which aspects of employment disputes should be resolved publicly or instead privately).

will necessarily continue to be our best means of resolving disputes. Instead, as we develop our new exciting technology, we must similarly be bold enough to rethink our dispute resolution processes. The difficulty of the endeavor should not deter us from taking on the challenge to rethink our systems of justice.