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Special Issue: *Contested Identities*

ABSTRACT Science was supposed to clinch OJ Simpson's guilt in the criminal trial that entranced both press and public in the United States for ten months in 1995. Prosecutors mistakenly expected the powerful technique of DNA fingerprinting, or 'DNA typing', to establish Simpson's presence at the crime scene and to confirm his subsequent flight to his own estate. By acquitting Simpson after less than four hours of deliberation, the jury sensationally rebuffed the prosecutors' expectations. Fifteen months later, it was the mundane evidence of bloody shoeprints, not scientific authority, that prompted a civil judgment against Simpson for the same killings. In exploring science's failure to persuade the first Simpson jury, this paper focuses on the trial as an arena in which visual authority had to be created and defended. Scientific evidence must be seen to be believed; yet, a trial is also a proceeding in which visual authority is deeply contested. The paper suggests that the judge's rôle in constructing authorized lines of sight has not received sufficient attention in legal analysis and procedural reform. In the Simpson trial, as in other cases involving expert witnesses, the judge's uncontested remarks and rulings established at many crucial points whose vision would be authorized as expert, and in what circumstances lay vision could take precedence over expert sight.

The Eye of Everyman:

Witnessing DNA in the Simpson Trial

Sheila Jasanoff

The trials of OJ Simpson began and ended in a trail of blood. From 24 January to 2 October 1995,[1] the former star athlete and media personality was tried for the double murder of his wife, Nicole Brown Simpson and her friend Ronald Goldman. Just a year after his sensational acquittal, in October 1995, he became the defendant in a civil suit initiated by the victims' relatives. On 4 February 1997, in an equally stunning reversal, he was found liable for having caused the deaths of Goldman and Nicole Simpson. Goldman's family was awarded $8.5 million in compensatory damages; days later, Simpson was assessed an additional $25 million in punitive damages. Blood evidence, presented both verbally and visually, played a crucial rôle in both trials, but it was received with greater scepticism by the jury in the criminal trial. Put differently, the prosecution failed in the criminal proceedings to 'black-box' the DNA evidence in such a way as to eliminate its interpretive flexibility; accordingly, the jury was able to dismiss as insufficient the 'DNA fingerprints' that allegedly linked Simpson to the crime scene. Science's 'immutable mobiles' did not in this case succeed in persuading an audience of non-scientists.[2] In exploring

Social Studies of Science **28/5–6(October–December 1998) 713–40**

[0306-3127(199810/12)28:5/6;713–40;007022]

why, I shall argue that, for scientific evidence to carry weight in the courtroom, not only the inscriptions shown to the jury, but the eye that frames them, must be certified as authoritative. The judge's rôle in creating and sustaining such privileged visual positions is the central topic of this paper.

The prosecution's opening argument in the criminal trial explained how the victims' blood was carried from the site of the murders to Simpson's Brentwood estate, first on bloody footprints, then on the door and floor of the white Bronco, then on bloodstained gloves and socks, drop by drop right into the accused's own bedroom. Supported by masses of physical evidence, and given both readable form and personal identity through DNA analysis,[3] the blood seemed almost to acquire a life of its own, with the power to speak for the two victims whose voices had been so cruelly silenced. Yet, shockingly to many observers, the jury acquitted Simpson at the end of a nine-month trial, after less than four hours of deliberation. Ironically, it was not so much the science of DNA typing as Simpson's sartorial vanity that led another jury, little more than a year later, to find him liable for having caused the deaths. The most incriminating piece of evidence in the civil trial consisted of thirty pictures of Simpson shot by a freelance photographer at a 1993 football game. They showed the defendant wearing the rare, size-12 Bruno Magli shoes that he had once disparaged as 'ugly-ass', and firmly denied owning. Between 1991 and 1993, only 299 pairs of that particular model had been sold in the United States.[4] One pair helped clinch Simpson's guilt more effectively than all the DNA evidence in the earlier trial.

A Failure of Translation

For many months, from the grisly murders on 12 June 1994 to the 'not guilty' verdict on 2 October 1995, Simpson's fate was thought to hinge on 'DNA fingerprinting' (more formally known as 'DNA typing'), a supposedly unerring method of identifying people on the basis of unique patterns in their genetic material.[5] Barely contested when it was first introduced into American courts, DNA evidence became increasingly controversial following *People v. Castro*,[6] a 1989 decision by a New York trial court which ruled that the test's reliability had not as yet been adequately established. That decision sent both scientific and law-enforcement institutions scrambling to close down any further questions about this invaluable forensic technique, and to ensure its unproblematic acceptance by the courts. The Office of Technology Assessment, an advisory body to the US Congress, reviewed the scientific and legal status of DNA typing in 1990.[7] The National Research Council (NRC), the policy arm of the National Academy of Sciences and the nation's most respected source of science advice, studied the technique in 1992; when some of its recommendations were challenged, the NRC convened a second committee to produce a more authoritative follow-up report.[8] The Federal Bureau of Investigation (FBI) launched an immense effort to standardize the procedures for

collecting and analyzing DNA samples from crime scenes. Meanwhile, as several papers in this Special Issue show, a rapidly expanding array of private DNA-testing companies hastened to develop reliable systems of peer review and proficiency testing.[9] In 1994, the Federal Judicial Center attempted to systematize the response of judges to this still novel technique: one section of the FJC's reference manual on scientific evidence instructed the judiciary how to ask meaningful questions about DNA typing.[10]

Despite these energetic efforts, closure proved elusive. Both prosecution and defense lawyers in the Simpson case, for example, recognized the still-fluid character of DNA evidence, and rushed to line up allies for their particular interpretations.[11] Charismatic trial lawyers and law professors, well-established DNA-testing firms, staid professionals from state crime laboratories, and even a flamboyant Nobel Laureate scientist,[12] formed a star-studded instructional team for 'the most detailed course in molecular genetics ever taught to the US people'.[13] The prosecution, along with the majority of white Americans, seemed to accept the DNA evidence as conclusive proof of Simpson's guilt, forgetting in the process that 'blood doesn't talk – people do'.[14] The defense brilliantly aimed its attack on people rather than inanimate inscriptions,[15] charging the criminalists from the troubled Los Angeles Police Department (LAPD) with every kind of deviance, from inconsistency, carelessness and sloppy practice to racially motivated misconduct. By the trial's end, the 'mountain of evidence',[16] which prosecutors once had hoped would convict Simpson, had crumbled into an unimpressive, and unpersuasive, molehill.

The causes of this collapse merit careful analysis because its implications reach far beyond the immediate issue of Simpson's guilt or innocence. Was the first Simpson trial, as some have claimed, a truly singular event – unique in its blending of race relations, wealth, sexual jealousy, Hollywood glamour, media attention and the contingencies of local politics[17] – from which no general conclusions can be drawn about legal processes or the public understanding of science? Did the prosecution make a simple but fatal blunder in failing to reckon with the American public's fabled 'scientific illiteracy'? Were the lay jurors simply unable to absorb such complex technical data? Alternatively, if comprehension was not the decisive issue, then why did the jury in the criminal trial give so little credence to the testimony of prosecution experts?[18] Could the DNA-test results have been represented in ways that would have commanded the jury's trust? And do the answers point toward a wider need for law reform, especially in procedures for presenting and evaluating expert testimony?

To begin addressing these questions, we must situate the first Simpson verdict in terms that are more familiar to science studies, and to social analysis more broadly, than to legal inquiry: that is, as a display of radical disbelief in a story that sought centrally to exploit the authority of science.[19] Conventional legal scholarship, with its deep-rooted commitment to the existence of objective facts,[20] offers relatively few resources for understanding what makes, or unmakes, the credibility of scientific evidence in

the courtroom. Underlying the law's general rules for evaluating expert evidence is a barely concealed sociology of error – or, perhaps more properly, diverse *sociologies* of error. Evidence ceases to be acceptable in the eyes of the law when it is contaminated by preventable technical or moral failings – for example, a break in the chain of custody, unethical behaviour by a lawyer, dishonesty on the part of an expert witness or reliance on flawed science. The possibility of more radical contingency in the production of evidence lies outside the normal scope of legal analysis and self-awareness.

The dynamics of litigation are partly to blame, since they do much to obscure the complexity of the translations by which samples, artifacts, recordings or pictures become evidence.[21] Offering parties have little interest in presenting their technical evidence in a light that could increase the other side's scepticism. It is safer by far to treat evidence as the product of a few simple, black-boxed operations whose integrity can be defended according to the conventions of the legal game. Thus, for physical evidence, the notion of the 'chain of custody' transports the crime scene to the courtroom through a supposedly unbroken series of physical moves. For scientific evidence, the person of the expert witness contains, and in effect conceals, much of the behind-the-scenes work of translation, from the investigative site through the forensic laboratory into testimony at trial. When these simplifying mechanisms function as intended, the microcosms of crime and court are brought into apparently perfect alignment – as parallel universes whose actions mimic one another exactly, albeit at a temporal remove and in different styles and languages. In this way, admissible evidence transforms the events of the world outside into a courtroom re-enactment through a kind of artifice that claims at the same time the power of accurate representation.

For most legal practitioners, language is still the primary medium of translation between reality and its representation in litigation.[22] The facts of science are transported into the minds of judges and juries through language, strategically deployed – language codified into rules of admissibility, dramatically configured into opening and closing arguments, professionally packaged as expert testimony, and deconstructed through skilful cross-examination. Yet the courtroom is quintessentially also a theatre in which things are not only related but also shown in order to compel belief.[23] Visualization, no less than verbalization, is one of the techniques by which scientific evidence achieves credibility – and so gains, for purposes of legal decisionmaking, the status of fact. Nevertheless, processes for creating, or debunking, visual evidence have received surprisingly little attention in legal analysis, even though verbal testimony is in practice very frequently accompanied by visual supports.

In seeking to manage the interpretive flexibility of facts, the law of evidence has focused first and foremost on various rules and principles, such as the so-called exclusionary rule,[24] or the rules of admissibility,[25] by which judges can screen the parties' proffered accounts to make sure they are not blatantly flawed or untrue. There is a tacit assumption that

evidence which is not defective in these ways provides a more or less accurate mirror of reality. In practice, of course, scientific evidence is a far more complex production that necessarily draws on a wide range of social and cultural resources – such as the persuasive power of inscriptions (in our case, 'DNA fingerprints') in western societies, the authority of professional codes and standards, and judges' and juries' commonsense understandings of science. This incorporation of tacit cultural norms into the manufacture of credible evidence deserves more extensive scholarly attention.[26]

In this paper, I address the general problem of the authority of science in the courtroom through an examination of what is involved in making DNA evidence convincing to lay fact-finders. DNA typing is particularly interesting in this regard because, unlike much other forensic evidence, it rests on relatively secure theoretical foundations (contrast, for example, the cases of lie detectors and 'clinical ecology'[27]) and yet it has become highly controversial. The question of vision is crucial to my inquiry. What is it that judges and jurors see when they look at DNA evidence, and what makes their visual experience similar to or different from that of experts? I take it as axiomatic that neither belief nor disbelief in the reliability of DNA evidence should be privileged in probing the reasons for divergent assessments of its credibility.[28] I also follow recent trends in the study of visual representations in assuming no preordained hierarchical relationship between expert and lay perceptions of scientific images and inscriptions: what interests me instead is how each viewpoint may be constitutive of the other.[29] Drawing on transcripts and opinions from US legal cases involving DNA testimony, I suggest that seeing is an essential precondition for believing, but that the right to see is itself in dispute when science comes under legal scrutiny. To establish a privileged point of view with respect to scientific facts, conflicts must be resolved between divergent visual representations of the evidence, between direct and 'virtual' witnessing,[30] and between lay and professional vision.[31] Who resolves such disputes and by what rules, emerge therefore as substantial questions for the legal process.

Bloodstains and Signature Prints

In a pre-technological era, blood, it was thought, spoke directly to people, telling with unambiguous signs, sometimes even in plain speech, of deeds of infamy. Reminders of that simple belief survive in our cultural heritage, preserved in the resin of literary creativity. Lady Macbeth still walks the stage trying to wash the imagined blood of murdered Duncan from her hands, bloodstains so stubborn that one touch of them will change the colour of the sea, 'making the green one red'. The anxious mother in the Grimms' folktale, *The Goose Girl*, gives to her daughter at parting a white handkerchief into which she has let fall three drops of blood from her own finger. When the poor girl is forced by her wicked maid to dismount from her horse and drink from a stream, the drops of blood call out to her: 'If

this your mother knew, her heart would break in two'. In the Rajput legend of Siladitya, the hero's young queen is embroidering a turban of the finest silk for her husband to wear on his return from war. She pricks her finger and a drop of blood falls on the precious work. When she tries to wash it off, the drop spreads through the entire fabric, red stain on green silk, warning her that the husband she loves is dead.

But ours is an age of scientific enchantment. Blood, along with other bodily fluids and tissues, still speaks with authority, but only through the miraculous translations wrought by science and technology. DNA typing is one such miracle, and its unprecedented power to establish the truth is reiterated almost as a refrain whenever people have occasion to talk about its use in law enforcement. Mr Justice Orton, the British trial judge in *Regina v. Pitchfork*, the first murder case to use DNA evidence, introduced the theme of inevitability that soon became part of the technique's mystique: 'The rapes and murders were of a particularly sadistic kind. And if it wasn't for DNA you might still be at large today'.[32] Publicity literature for Cellmark Diagnostics, the private firm that carried out some of the DNA analysis for the LAPD in the Simpson case, boldly announces: 'It is nature's perfect identity test. No other test can give such certainty'. According to an article in *Nature*, DNA typing is 'perhaps the greatest advance in forensic science since the development of ordinary fingerprints in 1892'.[33] New York State's director of criminal justice observes with more becoming, or prudent, circumspection: 'DNA is an extremely powerful tool that enhances the truth-finding function of the criminal justice system'.[34]

So effortless is the translation from guilty blood to signature prints in these popular tellings, that the abbreviation 'DNA' comes to stand, by a potent rhetorical economy, for the entire complex of mediations that lie between: note, for instance, the statements above by Justice Orton and the New York state official, representing DNA as a free agent. Yet the metonymic genius of language that converts 'DNA' into a stark signifier of truth suppresses a world of social activity. Simply collecting samples can pose enormous problems of police work when crimes are committed by strangers. To identify the rapist-murderer Colin Pitchfork by means of DNA typing, the Leicestershire police had to analyze blood samples from some 2000 young male 'volunteers', aged 17–34, at a cost of about $250 (£160) for each analysis.[35] The sheer scale of the enterprise was staggering by comparison with routine forensic and medical testing. The novelist Joseph Wambaugh gives a memorable if highly coloured account:

> They were drowning in blood. There were vials on every shelf. The freezers were full of it. There was more young British blood flowing in Leicestershire than had been spilled at the Somme.[36]

Especially ironic in the light of Justice Orton's sentencing homily is that none of the heroic effort spent on DNA sampling succeeded directly in fingering the murderer. Pitchfork had persuaded a reluctant friend (he, too, was a 'volunteer', but marching to a renegade drummer) to give blood

in his place. Only when the friend confessed the substitution was Pitchfork identified as the principal suspect: DNA evidence then served to confirm the identification.

'You Can't See Molecules'

Reflecting on the production of evidence in court cases, we recognize that legal practitioners, no less than scientists, are professional fact-makers, who weave objects, images, and rhetoric into narratives designed to compel assent from their intended audiences. Just as experimental scientists use words and inscriptions to project the social space of their laboratories to distant witnesses, so legal advocates seek to transport the crime scene into the courtroom, making it real for viewers removed in time and place from the original events.[37] Legal argumentation, like reports of scientific experiments, appeals to an audience's powers of *seeing* the evidence, as well as reasoning from what is said about it. Visualization in the theatres of both science and law is governed by standardized professional practices, specialist discourses, and particular interpretive conventions. In both kinds of claims-making, facticity (or truth) is established only when the designated audience believes what is signified by the proffered representation.

But while displays of evidence within scientific communities may typically conform to mutually understood rules of representation (both graphic and linguistic),[38] lawyers and their expert witnesses perform before audiences who have not been trained to see reality in similar ways. As a result, the presentation of scientific evidence, and the training of the judge or jury to see it as scientists themselves do, proceed simultaneously in legal settings. Human eyesight, however, is not so easily disciplined to see the 'same thing' in the same way, even when the spectacle is directly accessible to the naked eye.[39] Scientific inscriptions, moreover, pose distinctive problems for non-specialist vision. They are highly mediated artifacts, often seen only with the aid of instruments (telescopes, gravity-wave detectors, electron microscopes, modelling software and, in DNA analysis, electrically charged gels) that confer a monopoly of vision on those who know how to use them.[40] It takes skill and resources to master the relevant instrumentation, and yet more resources to extend the monopoly so gained outward from the locus of scientific activity – the field study, clinical trial or lab group – to wider communities of 'virtual witnesses'. Yet, as Steven Shapin and Simon Schaffer have elegantly argued,[41] precisely such extension beyond an immediate circle of observers is needed to transform scientific claims into matters of fact. And the distant, peripheral witnesses retain, in principle, the right to rebel against the metropoles of science, its 'centres of calculation',[42] by reasserting their own undisciplined and individualized vision.

In legal contests over scientific evidence, the superiority of the expert's trained and mediated vision over the lay fact-finder's unmediated witnessing needs to be formally established; it can never be taken for granted. Sometimes, an image or inscription presented in court is so direct and

unambiguous that assent is willingly given to the story it tells, without need of further instruction. In an X-ray photograph, the pair of surgical scissors carelessly left inside the patient's body is visible to all, a perfect translation. There is even a legal doctrine that acknowledges the complete, self-contained nature of such visual demonstrations: *res ipsa loquitur* (the thing speaks for itself).[43] Ordinary fingerprints have come to be accepted in this way, as universally recognized signifiers of truth,[44] although they are the products of specialized, continually changing and potentially contestable instrumentation and technical practices. Even the interpretation of fingerprints, as Simon Cole shows in his paper in this Special Issue,[45] has long been the province of licensed, professional skill.

In sharp contrast with these examples, courtroom exchanges concerning the reliability of DNA typing reveal, especially in early cases, a far from taken-for-granted relationship between expert claims and their reception by lay observers. The questions posed by judges and lawyers exhibit deep skepticism about the experts' capacity to see authoritatively what is denied to other people's senses. The expert witness and the examining lawyer collaborate to instruct, cajole, and rhetorically retrain the fact-finder's eyesight, with greater or lesser success, to 'see' DNA and so, by a metonymic transfer of meaning, to perceive the truth whole.

The theme of DNA's visibility was broached in *Andrews v. State of Florida*,[46] the first US criminal trial to rely on identification by DNA typing. A prosecution witness ('*A*' in the following extract) was questioned by the defense lawyer ('*Q*'), who expressed the naïve scepticism of untrained seeing. In this exchange, the lawyer seeks perhaps to impart to the jury some of his own resistance to seeing eye-to-eye with the expert:

> *A*: Generally, you would examine pieces of DNA that would be in the range of one thousand to ten thousand units in chain length. That's a rough approximation. Because you could look at one slightly bigger or slightly smaller.
> *Q*: Not knowing what a unit is, I am still trying to get this down into something a lay person could try to fathom.
> *A*: All right. I tell you what. That one cell in your finger, if you take all the DNA of that one cell out, it would be about nine foot long.
> *Q*: If you could stretch it out?
> *A*: If you could stretch it out, it would be about nine foot long. Does that help you?
> *Q*: It would be pretty thin, though, wouldn't it?
> *A*: Yeah. But if you were – yeah. If you then were to cut it up into little bits, each one would have a specific discrete length you would measure with a real small ruler.
> *Q*: Just the cell that we are talking about, in order to be able to see that, would require magnification under a microscope of what kind of magnification just to see the cell, itself?
> *A*: Depends on how much detail you'd like to see. Couple, hundred fold, you would start to see some pretty good detail.[47]

In another case, *State of New Jersey v. Williams*,[48] it was the presiding judge who crossed sights with the expert witness, asking for a persuasive explanation of what it means, in terms of common, non-expert experiences

of seeing, to 'amplify' DNA fragments through polymerase chain reaction (PCR):[49]

> *The Court*: Now when you say – when you reduce it to its pure form, it is about a drop.
> *The Witness*: Well, one has about a drop of fluid. Now -
> *The Court*: Of pure DNA?
> *The Witness*: No, no, no. No, no, no. This is, perhaps, the thing that is confusing the Court. The Court apparently has the idea that you can see molecules.
>
> You can't see molecules. But you can test for their consequence. You simply – one has the idea that you have one of these cocktails. You have one of these cocktails and there is a lid on this thing. A little cap and that's probably about one hundred times larger than what we have. We have this fluid here and we stick it in a thermal cycler and after 30 or 40 cycles the stuff comes fuming out and all of a sudden your laboratory is taken over by these DNA molecules. That's not what we are talking about here, Judge. It is not like – it is not like in one of these things you see in science fiction movies.
>
> *The Court*: You are telling me whatever it is that is in this tube you could amplify it millions and billions of times. But when I look at what is inside that tube it looks like the same volume.[50]

'You can't see molecules. But you can test for their consequence.' Could one ask for a more concise or compelling statement of the metaphysics of modern science as it pursues things unattempted yet by the unaided eye? Yet in legal settings, as indeed in any wider arena where scientific findings entail normative as well as epistemological consequence, it is essential to enroll the possessors of common vision into seeing the same truths that scientists see with their enhanced capacity for sight.[51] The expert in *Williams* is intensely aware of this obligation as he delves into his repertoire of culturally authorized imaginative resources to pull the judge into his way of seeing things. Shared social myths about the nature of science ('science fiction movies') form part of this repertoire, as do shared understandings about lawyering: a moment after the foregoing exchange, the expert says to the judge, speaking of the fluid amplified by the PCR process: 'It is a fairly simple cocktail. It is simpler than many drinks I have seen lawyers make for themselves'.[52] The lines of vision intersect again, as the expert appeals to another common cultural resource – the mixing of cocktails – to explain the translation of blood to DNA. It is from such dense cross-hatchings of lay and expert, communal and esoteric, vulgar and initiated – in short, immediate as well as mediated – witnessing that credibility is constituted in legal contests over scientific evidence.

Framing Vision, Constructing Expertise

Scientific testimony presents particular challenges for adjudication because courts are reluctant to assert with respect to scientific fact-finding the same unconstrained sovereignty that they assume with respect to all other kinds

of facts. The legal community has long taken for granted that the demarcation between reliable and unreliable scientific viewpoints is established in important part outside the purview of the law and can be unproblematically imported into legal proceedings. This assumption underlies the calls by conservative law reformers to eliminate 'junk science' (the unreliable offerings of untrustworthy experts) from the courtroom and to replace it with 'mainstream science'.[53] Rules governing the admissibility of scientific evidence also assume that the demarcation between genuine and spurious expertise is already there for judges to find. Judges are seen as 'gatekeepers', because they have the power to let in the reliable testimony and shut the gate against mere pretence. Thus the 1923 federal appeals court decision in *Frye v. United States* announced the 'general acceptance' test of admissibility.[54] The ruling instructed judges to discover, in effect, which scientific views were generally accepted and which were not; evidence that failed the acceptability test was not admissible.

Of course, the so-called *Frye* rule proved easier to conceptualize than to apply in practice. Courts soon found themselves in disarray, disagreeing on how many experts were needed for *general* acceptance, and whether novel offers of scientific and technical proof, such as radar detection devices to establish speeding violations, voice-prints to prove a speaker's identity, or the statistical analysis of literary style (stylometry) to establish authorship, were generally accepted.[55] Legal commentators attributed the disconcertingly divergent results to judicial 'inconsistency', and asked for clearer rules to enable judges to discern more reliably just where authentic claims shade off into the grey zone of unacceptability. The 1993 decision in *Daubert v. Merrell Dow Pharmaceuticals, Inc.* was the answer offered by the nation's highest court.[56] *Daubert* replaced *Frye* with the injunction that evidence should be scientifically reliable and relevant in order to be admitted. Reliability, the Court further opined, should be decided according to criteria used by scientists themselves. For starters, the Court offered four non-exclusive criteria: does the evidence rest on a tested and falsifiable theory or technique; has the underlying science been peer-reviewed; what is the technique's error rate; and is it generally accepted?[57]

By looking to externally certified demarcation criteria, the *Frye–Daubert* approach chose to overlook the court's own contingent and case-specific rôle in establishing the preconditions of credibility. Judges, as I have suggested in earlier writing,[58] do not so much *find* as actively participate in *creating* the dividing lines between appropriate and inappropriate offers of expertise. They do so by selectively privileging some expert viewpoints over others, by creating new hierarchies as needed among classes of potentially credible experts (thus, 'scientists' may be more highly ranked than 'technicians', 'treating physicians' than epidemiologists, epidemiologists than toxicologists, and so on). At the limits, they may exclude some experts altogether, or appoint their own experts to provide more neutral scientific accounts than those presented by the parties' experts.

Less blatantly, though no less influentially, judges also import into demarcation decisions their own submerged understandings of the methods

of science. Lay perceptions of how science works constitute in this way the template against which courts measure the acceptability of expertise. For illustration, let us turn to a California drunk-driving trial involving a police practice known as 'horizontal gaze nystagmus' – a 'field test' in which inspection of the suspect's eyeball movements (a most literal form of 'eyeballing') provides an index of drunkenness or sobriety. The California judge excluded the evidence, ruling that the administering police officer could not be credited either as a lay witness (his vision was too experienced for that designation) or as an expert (his vision was not properly disciplined by the scientific method).[59] To count as expert, the court indicated, the officer's vision should have been mediated by recognized scientific practices, such as instrumentation or quantification. We return again to the issue of authoritative vision. At the heart of the US legal system's often agonized inquiries into the admissibility of expert knowledge is still the recurring question: 'Whose sight can we trust, if not our own?'.

In a perceptive analysis of the infamous Rodney King case, the anthropologist Charles Goodwin observes that visual evidence acquires special power when it is certified as 'professional vision'. Raw observation, he suggests, is often meaningless unless it can be disciplined into particular 'socially organized ways of seeing and understanding events that are answerable to the distinctive interests of a particular social group'.[60] Goodwin calls attention to three discursive practices – coding, highlighting, and producing and articulating material representations – that lawyers and expert witnesses use to impose meaning on a jumbled mass of visual impressions. In the trial of King's assailants, a murky videotape of the beating was translated into two conflicting narratives, an uncoded lay version and a coded professional version offered by Sergeant Charles Duke, a member of the LAPD but also an expert on police practice. In the victim's (lay) rendition, the tape displayed a single, continuous action, depicting a helpless, unresisting African-American man being viciously beaten by a gang of white attackers. In Duke's (professional) version, the scene was analytically fragmented into a sequence of disjointed mini-events, in which the jerky movements of the victim's separate body parts offered to trained police officers the rationale for new 'assessment periods', 'escalations of force' and strategically directed 'kicks' and 'blows'.[61] Goodwin concludes, following Foucault,[62] that the power to engage in professional speech, and so to constrain the fact-finder's vision, is unevenly distributed across society. This imbalance makes it extremely difficult for those lacking the resource of professionalism to represent their points of view as rational, credible or true.

Convincing as Goodwin is in deconstructing the expert testimony on Rodney King's beating, he underestimates the contingency of courtroom demarcations between lay and professional vision. Legal inquiry has the power to redefine the very parameters of professionalism from one case to another. Perhaps the most interesting feature of the King trial, in the light of Goodwin's analysis, was the court's willingness to admit Duke as an expert on police brutality, an issue that could as easily have been left as a

matter for lay determination. How did Duke, an LAPD officer, lay claim to such expertise? By contrast, in the California decision on 'horizontal gaze nystagmus', expert status was denied to the police officer who claimed to 'see' a driver's alleged inebriation with specially authorized, professional sight; courts in other states have decided the same issue differently. The credibility of professional observation was constituted within the confines of the trial itself, with the judge acting less as gatekeeper than as lexicographer, or definer, of 'expertise'. Episodes from the Simpson case display a similarly active judicial involvement in the very definition of expertise.

A Protocol for Witnessing

In the Simpson case, conflicts over the credibility of DNA evidence began at the pre-trial stage, in hearings to determine how the blood samples collected at the crime scene would be shared and how integrity would be ensured in their testing. The prosecution considered it sufficient to have a private company, Cellmark Diagnostics of Germantown, Maryland, carry out some of the DNA typing in accordance with the firm's established procedures. The defense resisted this move by questioning whether Cellmark had any privileged claim to credibility. An exchange on 27 July 1994 between Marcia Clark, the lead prosecuting attorney, and Robert Shapiro, a lead defense lawyer, before Judge Lance Ito, centred on the trustworthiness of Cellmark's procedures and, by extension, on the adequacy of 'virtual witnessing'.

Clark sought to black-box Cellmark's expertise, which she argued was appropriately constituted within a closed, professional space defined by the company's testing protocol. The defense experts, she asserted, were welcome to attend and watch the tests being performed, but they could not exercise hands-on control, and would have to remain in this sense outside the periphery of Cellmark's operational rules. Only in this way could Cellmark's professional independence, integrity and ultimate credibility be assured:

> *Clark*: Cellmark is an independent laboratory and they have procedures, protocols, and standards that govern the manner in which they handle their evidence. They have furnished a copy of these guidelines to counsel and in that it indicates that outside experts are not permitted to use their equipment or handle the evidence, and that is for the purpose of maintaining the chain of custody and the integrity of that chain of custody. If they turn it over, to an outside expert, then they have a break in the chain with the problems and the complications that may ensue from that.
>
> . . . .
>
> But let me clarify what their objection is, now that I think I understand it. First of all the case samples, these are not blood samples taken from a hospital in which you are doing a medical diagnosis and you have vials of blood in large samples. These are crime scene samples. They're small. The logistical problem of crowding many people around . . . with respect to having the actual

> cutting done, the only way that Cellmark can assure that quality is controlled, or there is quality assurance in the manner in which the cutting is done is to have their own people do it, and follow their own guidelines.[63]

Cellmark's credibility derived, in Clark's account, from the very specificity of its practices. The company's domain was forensic science, a unique kind of activity whose protocols could not be expected to conform to other forms of scientific practice, even to customary rules of medical research using similar techniques. 'Crime scene samples', she emphasized, are 'small', unlike the vials of blood obtained from medical patients. Only a professional body with experience in handling such samples could be trusted to manipulate ('cut') the DNA in credible fashion, using its own people and following its own guidelines. Other observers would simply have to rely on the integrity of Cellmark's rule-governed and experientially legitimated professional space. As long as the company followed its own rules, and this *could* be checked by watchful defense experts, its conclusions, she suggested, should win universal acceptance.

Shapiro's parsing of the determinants of credibility was less deferential and more democratic. For him, it was not enough to have Simpson's defense experts simply watch Cellmark's professionals at work, turning samples into evidence through the company's codified rules of practice. He asked for more active control:

> *Shapiro*: After reviewing the protocol which Ms Clark said we had, which we did not have until yesterday by fax, it's clear that the procedures outlined by the laboratory that the prosecution has chosen serve no purpose whatsoever. For us to have experts there witnessing some parts of their procedure serves no purpose whatsoever. I talked to Dr Lee [a respected expert from the Connecticut state crime lab] at length yesterday on this issue, and he said it just would be an exercise in futility to merely stand there, under these guidelines, and observe what they are doing regarding testing procedures, so we would respectfully again ask the court to revisit the issue of giving us a 50% sample so we can do our own independent testing. Short of that, to give us some access to watch under some defined terms is something that will be of no probative value whatsoever.[64]

One is instantly struck by the predictable, even instinctive use of lawyer's tricks in this richly textured passage: the implicit accusation of bad faith in the late delivery of the fax, and the impugning of Cellmark's independence by calling it 'the laboratory that the prosecution has chosen'. But behind Shapiro's adversarial gibes was a more serious, global objective – the desire to wrest control of scientific fact-making from the prosecution and its designated experts. To do this, he had to deny the power of mere observation to validate the integrity of somebody else's professional practice (simply watching, he said, 'will be of no probative value whatsoever'). Seeing, he implied, must be indissolubly linked to doing, in a seamless, inviolable, self-contained world of technical practice, in order to guarantee

the credibility of the inscriptions it produces. So much for Robert Boyle and the force of 'virtual witnessing': here, immanent in prosaic, 20th-century law talk, was Hobbesian scepticism triumphant.[65]

The judgement that Clark and Shapiro called upon Ito to make was not therefore the classic Solomonic one of deciding how to divide drops of blood too small for conventional laboratory diagnosis between two contending parties. More than each side's proprietary rights to the samples was at stake here (although ownership was an issue that Shapiro explicitly raised). In deciding whether to give the prosecution complete control over the samples or to surrender '50%' to the defense, Ito was confronted in effect with opposing philosophies of credibility, founded on different understandings of the connections between doing, seeing and believing. A superficially childish 'custody dispute' over blood samples drew the judge into evaluating the professional lifeworld of DNA typing, as constructed by a private testing company and sanctioned by a police department. By choosing to approve Marcia Clark's theory of witnessing, Ito helped to reinforce the boundary that Cellmark wished to draw between its own world of expert practice and the watching world outside.

Lies and Videotape

Rulings that would eventually have an impact on the credibility of DNA evidence did not necessarily concern the manipulation of blood samples to start with. A notable example of such a collateral judgment was Ito's decision to admit a videotape of police activity at the crime scene over the prosecution's strenuous objections. In seeking to exclude the tape, Marcia Clark advanced on behalf of the prosecution an argument similar to Goodwin's claim that 'all vision is perspectival and lodged within endogenous communities of practice'.[66] Three extracts from an admissibility hearing held on 23 February 1995 show Clark trying in vain to establish the need for professional interpretation to make sense of the camera's testimony:

Clark (1): As the Court can see, at the very point so far when the defense would ask the jury to make an inference, the very point that they're trying to make is obscured. This epitomizes the problem with this whole tape. It looks from this that everyone is standing on top of each other with not two inches between them. We know that is not the case. That obviously can't physically be the case. But it's such a misleading and distorted clip that you can't tell where everyone is standing.

Clark (2): This is a piece of evidence that is not evidence. This is a distortion, this is a method of confusion, and it does not inform the jury of anything of probative value. In fact, quite contrary. It obscures the fact that it purports to – that the defense says it purports to show.

Clark (3): Furthermore, and lastly, that they have not produced a cameraman who could tell us where he stood. I'm sure it will be something in the nature of across the street. He will – and someone who will tell us the nature of the lens he used. I'm

> sure there's some sort of telephoto lens. And I'm sure that if an expert were called ... they will inform the Court of just how distorting and misleading this really is.[67]

Plain, unmediated eye-witnessing of the videotape, Clark exhorted the court, would not allow the jury to see without distortion what in fact had happened. The tape was the product of a specialized technical practice – photography – with its own internal mysteries of skill and interpretation. It was an encoding of reality rather than a mere reflection of it, and, without an expert decoder such as a cameraman to help them, the jurors would not be able to decode it properly. They would be misled into thinking, for instance, that the LAPD investigators (including, as it happens, the criminalist Denis Fung who was later to be cross-examined by Barry Scheck) were standing on top of each other, when they had actually maintained a proper distance. As in the Rodney King case, the prosecution claimed that the naked eye was not to be trusted with a video. Unless the tape could be seen through the filter of expert interpretation, it was 'a piece of evidence that is not evidence'.

Against this attempt to recast the video as a kind of professionally mediated vision, Johnny Cochran, another of Simpson's lead defense lawyers, offered an appealingly uncomplicated counterargument. The video provided, after all, a form of direct witnessing, as anyone could see. Cochran claimed the perspectival as well as the moral high ground:

> We are the ones introducing the truth here – we're showing a videotape. Now, the fact that somebody can't see somebody's legs, that's preposterous, Your Honor. The part of a videotape, the beauty is you stand there and you look at it, and you can tell where people are standing in the shrubbery. You can see exactly where they are. That's what a videotape is.[68]

Ito was persuaded. Although he claimed to be fascinated by the prosecution's arguments, he ruled in favour of the defense: the videotape, he concluded, was ostensibly 'as accurate a depiction as we will ever get. It is not someone's recollection or interpretation. It's the events as they unfolded'. As if convincing himself of the rightness of this judgment, Ito went on to describe aloud all the comings and goings that he could discern on the tape, without any need for an expert to decode it:

> And *the court is able to discern* from looking at the videotape itself that this videotape was taken at a relevant point when the coroner's investigator, Ms Radcliffe, arrives, she appears to be briefed by Detective Lange. We see Radcliffe and Lange at the top this – *what clearly appears to me* to be the top of the steps. *I then see* them move down to within two steps above the body of Nicole Brown Simpson at the bottom of the stairs. *I observe* them to be looking over the body, and Lange appears to be describing to Radcliffe what is there.[69] [my emphases]

Imperceptibly – signalled only by shifting the locus of visual perception from the third person of 'the court' to the first person of 'I' and 'me' – Ito became Everyman, asserting the supremacy of his own unmediated vision

and looking back upon 'the events as they unfolded' through the transparent, and for him truthful, window of the videotape. Yet, not until Ito finished his public-private deliberation was it clear that, for purposes of *this* trial, the videotape would count as a form of direct, not technically or professionally mediated, seeing, so that the jury, like the judge, could view the tape without the aid of intervening experts.

Standardizing Vision

DNA evidence was excluded in a number of trials before Simpson's because the inscriptions were produced in accordance with methods that were shown to be *ad hoc*, non-standard and therefore unscientific in the eyes of experts as well as laypersons. What the experts saw and how they claimed to see it were the central issues, and differences among testing laboratories served to undermine particular expert positions. Work in science studies has dwelt in some detail on this aspect of legal controversies, showing how adversarial processes deconstruct credibility by bringing to light myriad tacit and untested assumptions about physical and social reality that enter into the production of science.[70]

In *Maine v. McLeod*, a sexual molestation case, the defense questioned the way in which scientists at Lifecodes, a DNA-testing firm, had identified a match between two samples. The two 'fingerprints' in this case were not identical to the untrained eye: although the pattern looked the same, the bands in one print were displaced relative to the other, suggesting that the DNA fragments in the two samples were of different lengths. The Lifecodes experts had used a mathematical formula to correct for the observed bandshift; this adjustment allowed the lab to find sameness where lay observation might have been inclined to see differences. In this case, the court refused to defer to Lifecodes' visual authority because the adjustment procedure used by the lab had not been reviewed or approved by a wider scientific community.[71]

Standardization offered to testing laboratories and law-enforcement institutions an attractive way out of such quandaries. Standards serve to black-box messy technical practices: behaviour conforming to explicit standards tends to be more resistant to sceptical questioning. Yet, as the Simpson case revealed, standards in the legal context can prove to be a two-edged sword – as much a measure to discredit non-compliant conduct as to protect compliance. Once techniques of visualization are standardized, for example, deviance from the standard can be condemned in normative terms that are equally persuasive to experts and laypeople. For example, Eric Lander, a scientist at MIT's Whitehead Institute who had testified for the defense in *Castro*, and his co-author, FBI expert Bruce Budowle, characterized the early controversies over lab procedures as follows:

> The initial outcry over DNA typing standards concerned laboratory problems: poorly defined rules for declaring a match; experiments without controls; contaminated probes and samples; and sloppy interpretation

> of autoradiograms. Although there is no evidence that these technical failings resulted in any wrongful convictions, the lack of standards seemed to be a recipe for trouble.[72]

The language that Lander and Budowle used to debunk the efforts of prior workers in the field is striking in its mundaneness.[73] *Anybody* of normal mental capacity can understand concepts like 'poorly defined rules', 'contamination' and 'sloppy interpretation'; even the idea of experimental controls is part of every American schoolchild's basic conceptual repertoire.[74] It takes no special scientific skill or expertise to understand deviance framed in these terms. A jury of high-school students would see the point, let alone a judge. Indeed, as recently as 1996, a Massachusetts judge used very similar discrediting language to exclude evidence produced by the technique of polymerase chain reaction in a Boston laboratory. He found the work 'haphazard' and not done 'by qualified people who follow the requirements that have been standardized'.[75]

Standards, then, can be seen as a translation device that makes expert judgements about technical practices accessible to lay audiences, partly through the medium of mundane normative language. By invoking standards, a sceptical questioner can shift attention from the substantive to the procedural dimensions of scientific practice. As long as no-one questions what is meant by terms like 'haphazard' or 'sloppy', experts and non-experts can use the same words to assess credibility (even though their underlying opinions about what constitutes acceptable or unacceptable behaviour may not be the same).[76] Judgements concerning the credibility of science appear to be governed by standards of virtue, of ethical and reasonable behaviour, that are not special to science but are widely shared by the culture as a whole. These shared resources of trust and honesty constitute what Steven Shapin terms the 'economy of credibility'.[77]

Barry Scheck, a defense lawyer noted for his successful attacks on DNA-typing evidence, employed such commonsensical norms with devastating effect against the helpless LAPD criminalist, Denis Fung. In a remarkable cross-examination, Scheck repeatedly confronted Fung with violations of codified methods of DNA sample collection, and with seemingly careless and non-standard handling of samples and other objects throughout the early stages of the investigation.[78] Fung's supposedly aberrant practices (he had not consistently worn gloves, refrigerated samples, recorded entries, requested photographs, worked without spills) were relentlessly juxtaposed against the idealized work rules laid out in a published manual of forensic DNA typing.[79] Fung conceded under pressure that he had delegated some of the work to an even less experienced subordinate and had subsequently tried to cover up this fact. These homely but telling displays of ignorance, incompetence and bad faith not only demolished Fung's credibility (we note that, as a 'mere' technician lacking the social accoutrements of scientific expertise, Fung may have needed an especially dogged mastery of technique to command belief), but also brought to light impediments that no juror could ignore in the rhetorically unobstructed passage from 'DNA' to 'truth'.

But what made it so easy for Scheck to make light of Fung's technical competence? The criminalist's inability to constitute his way of seeing as legitimate professional vision is surely part of the answer. Again and again, as the trial transcript records, Scheck impeached the veracity of Fung's ways of seeing, aided in this endeavour by the videotape that gave the jury its own apparently unmediated access to the LAPD's behaviour at the crime scene. In one tenacious stream of questioning, Scheck planted doubt about Fung's having really seen the bloodstains on the door of Simpson's white Bronco on the day after the murders:

Q: By Mr Scheck: Okay, Mr Fung.
Let me ask you directly, on June 13th in the morning, did Detective Fuhrman point out four red lines, red stains to you on the bottom of the Bronco door?
A: I don't recall him doing so.
Q: When you say you don't recall, are you saying it didn't happen?
A: I'm not saying that. I'm saying I don't recall if he did or if he didn't.
Q: All right. If you had seen four stains on the exterior of the Bronco door on the morning of June 13th, you would have taken a photograph of them; would you not?
A: That would depend, but I don't know. But that would depend on the circumstances.
Q: Let's try these circumstances. You were pointed out a red stain by the door handle?
A: Yes.
Q: You were photographed pointing to that red stain, correct?
A: Yes.
Q: And you're the person that's supposed to direct the photographer during the collection process?
A: Yes.
Q: You're supposed to photograph items of evidence of some importance that are pointed out to you by the detectives?
A: Yes.
Q: In the circumstances of this case, if you had seen four red stains on the exterior of the Bronco door, would you not have directed the photographer to take a picture of it?
A: It would be likely. Yes.[80]

What Scheck achieved in this and many similar exchanges was not merely to make Fung change his mind or publicly admit error. It was rather to negate the prosecution's science-based strategy for making jurors into virtual witnesses; this he accomplished by questioning Fung's visual authority, and thus breaking the chain of visual custody, as it were, at one of its weakest links. With Fung unable to testify that he saw the stains before Fuhrman had a chance to plant them, no amount of subsequent scientific manipulation could empower the blood evidence from the Bronco to bear witness to the crime.

In everyday litigation, as the material constituents of evidence are converted into scientific facts, their humble origins in the work of individual eyes and hands get lost from view, and with this loss comes a forgetfulness about the shared social and scientific foundations of credibility. Lander and Budowle displayed such a conditioned blindness when they

acknowledged the troubled prehistory of forensic DNA typing, but dismissed it none the less, on the ground that 'there is no evidence that these technical failings resulted in any wrongful convictions'.[81] Scheck's cross-examination of Fung turned this dismissive assessment on its head by reasserting the primacy of hands-on fieldwork over more theoretically sophisticated expertise; reduced to micro-details, the methods by which the LAPD had attempted to transport the crime scene into the courtroom were shown to be all too fallible. Mundane credibility judgements about Fung's manifold 'technical failings' could then be used with great effect to undermine the prosecution's 'scientific' evidence of Simpson's guilt.

Questions of Process

At the beginning of the criminal trial, Judge Ito's calm demeanour and measured responses to the lawyers' and media's frenetic manœuvring won wide commendation. He was praised, in particular, for his allegiance to the emerging 'truth school' among scholars of constitutional and criminal law, a nascent intellectual movement determined to cut across the intense ideological polarization of pro-defense and pro-prosecution positions on the admissibility of evidence.[82] For adherents of this school, 'DNA' promised to be the perfect ally, an able, almost infallible and (important in America's race-conscious justice system) potentially colour-blind assistant in the programme of truth-finding. But a common-law trial is not purely and simply a search for the truth: it is, more accurately, a contest of credibility between two carefully packaged, competing accounts of the 'same' reality. Plausibility is what carries the day: by trial's end, the winning story is the one that strikes the fact-finder as the more believable.

Assessing the credibility of scientific evidence, I have suggested, presents particular difficulties because courtroom science simultaneously appeals to different cultures of belief. Lay intuitions and perceptions of the world, founded upon direct, unmediated witnessing, continually bump up against professionally configured claims of 'virtual' or expert vision. What professionals see with their skilled and instrumentally enhanced capacity for sight, and what they render into words through specialized discourses, overlap imperfectly at best with what lay assessors of the evidence see and hear with their unaided senses: 'you can't see molecules', the experts say, but you should trust us to see them because we can 'test for their consequence'. Trial outcomes in complex cases hinge therefore on the extent to which the judge or jury gives controlling weight to the expert's distanced and instrumentally mediated gaze on reality. In the Simpson criminal trial, expert testimony about DNA evidence had to compete for credibility with other reconstructions of what had or had not taken place at the crime scene (quasi-experiments?), including the famously theatrical demonstration that the defendant's hand did not easily fit into the bloody glove found on his driveway.

Expert witnesses can overcome sceptical challenges like these by seeking to establish a common 'economy of credibility' with lay fact-finders

– whether by blinding them with science ('you can't see molecules, but you can test for their consequence') or by making science appear so transparent that no discrepancy remains between lay and expert vision. But the power to persuade does not depend wholly on the talents of particular witnesses or the dynamics of particular cases. Legal rules and practices of general application shape the overall context in which experts testify and may deprive some would-be experts of the opportunity to participate. What conclusions can we draw about the forms that such rules and practices should take, given what we have seen about the construction of privileged visual positions in the courtroom?

Court-Appointed Experts

In the United States as well as in Britain, clamour is growing to give the judiciary more power to appoint 'neutral', 'independent' or 'impartial' experts to supplement, or possibly supplant, the scientific stories brought to court by litigating parties. In both countries, judges already possess formal legal authority to bring in non-party experts at need – under Rule 706 of the Federal Rules of Evidence in the United States, and in Britain under Rules of the Supreme Court (RSC) Order 40. Until the early 1990s, the American judiciary was notably reluctant to use these powers, for logistical reasons as well as for fear of letting experts usurp the judicial function.[83] Since then, increases in the cost and complexity of litigation have invited a renewed look at this problem. A 1991 report by the American Association for the Advancement of Science (AAAS),[84] and a 1995 report by Britain's Lord Woolf,[85] converged strikingly in their prescriptions for increasing the role of court-appointed experts. In *Daubert*, and more recently in *Joiner v. General Electronic Co.*,[86] the US Supreme Court has also lent powerful support to this move.

Non-party experts possess a number of potential advantages in trumping other claims to privileged witnessing of the facts. Their views come to court bearing an *imprimatur* of impartiality that tends to boost their credibility. As a 'neutral' third eye in the traditional two-party format of litigation, the court-appointed expert might occupy a quasi-judicial position and would form, together with the party experts, a smaller 'facts' triad (a *de facto* Science Court) within the larger 'justice' triad comprised by the judge and the legal advocates. These dynamics could well make lay fact-finders less assertive in turning their own sceptical gaze on the scientific evidence, thereby reducing conflict, but also foreclosing critical inquiry into the mundane, taken-for-granted aspects of scientific practice and the normative presuppositions of experts.

Excluding Experts

Rules governing the admissibility of evidence provide another powerful method of enhancing judicial control over the parties' offers of expert testimony. *Daubert* and *Joiner* attest to the federal judiciary's growing frustration with the contributions of partisan experts. These cases assume

that legitimate expertise is constituted outside the processes of the law and can be identified by proper application of relevant demarcation criteria. As we have seen, however, expertise in the legal context is – to paraphrase Bruno Latour [87] and Richard Rorty [88] – more the consequence than the cause of demarcation. In designating some witnesses as legitimate experts, and in distinguishing among different forms of witnessing, judges inevitably impose on fact-finding their own understandings about whose vision of the world counts as authoritative (or genuinely 'scientific') and whose does not. In so doing, they limit the range of interpretive flexibility available to lay questioning.

The Simpson case shows that the exclusion of expertise may happen in subtle ways, without formal application of the *Daubert* criteria or other tests of credibility. At two points in the trial – the debates over sharing blood samples and admitting video evidence – Judge Ito was required in effect to choose between competing claims of (visual) authority. By accepting the adequacy of Cellmark's practices and protocols, he took sides in a nearly four-centuries-old argument about the experimental constitution of authoritative knowledge: Hobbesian scepticism was rejected in favour of the view propagated by Boyle's scientific progeny that a test protocol such as Cellmark's can codify a universally valid world of observation and deduction. Similarly, in rejecting Marcia Clark's attack on the authenticity of the defense video, Ito denied that the photographic framing of visual space was an act of technically mediated seeing, requiring decoding by the trained, professional eye of a photographer or film expert. The judge as Everyman asserted his own right to see a universal truth in the moving images of the videotape.

Conclusion: The Eye of Power

The institutional genius of the courts is their capacity to deliver binding solutions – judgements that people accept as right in both the epistemological and moral senses of rightness. Finality of this kind would be difficult to attain in a lawless democracy of sight, where the fact-finder's right to see was free at all points to challenge the expert's professional vision, and to question its testimony concerning things invisible to the untrained eye. Dispute resolution in a complex society would soon prove unmanageable without some constraints on the deconstruction of expert vision. Not every trial that involves DNA-typing evidence can or should go back to the basics of how scientists see DNA or measure its physical presence 'with a real small ruler'. Like any other working institution, courts have to set some limits on scepticism and distrust. The visual freedom of the lay fact-finder has to be tempered with deference to claims of privileged professional vision, provided of course that expertise is not simply accepted on faith.

Common-law courts have sought to regulate the fact-finder's potentially disruptive power of sight with rules that protect or enhance legitimate claims of expertise. Experts are exempted from the hearsay rule that

governs other testimony. More recent strategies for controlling scepticism allow courts to exclude forms of expertise that are seen as unscientific and to appoint, if they wish, their own experts to play a quasi-judicial rôle in fact-finding. These devices strengthen the already considerable authority of judges, enabling them in effect to shape the scientific debate in the courtroom to fit their own intuitive views of how science works and what counts as proper scientific expertise. Moves to enhance the rôle of science in adjudication are thus refracted through a generalist judiciary's understanding of the nature of science.

By following disputes about the credibility of DNA evidence in and out of the first Simpson trial, I have tried to show that drawing demarcation lines between credible and incredible offers of expertise is never simply a matter of rule-following or rule application. Expertise – contrary to what the law may doctrinally presuppose – is constituted or reconstituted to some extent within the framework of each trial. The 'expert' designation reflects not only the judge's appraisal of the qualifications of particular professionals but also underlying conceptions of where professional authority, including the right to see differently, begins and ends. Judge Ito helped to refine the social meaning of expertise just as surely when he ruled on the sharing of blood samples (upholding Cellmark's expertise) or the acceptability of videotaped evidence (denying the need for expert interpretation) as in any more explicit judgments about who could testify as an expert on DNA typing.

The judge's eye, then, is the eye of power. Its authoritative position may need to be accepted in the interests of social repose – but it need not be accepted uncritically. In conflicts over whose perception of the truth or the facts should take precedence, the inevitable plurality of vision that litigation generates must be disciplined in somebody's favour, consistently with wider notions of efficiency, fairness and justice. The innumerable, contingent disputes that any trial opens up between different ways of seeing require someone to turn to as the witness of last resort. This, in western legal systems, is one of the essential functions of judging.

What a democratic society should wish to cultivate, however, is an informed exercise of judicial power, deeply cognizant of its own rôle in constructing expertise rather than unthinkingly ratifying others' ill- or well-founded claims to privileged sight. In an age of heightened sensitivity to difference, and the far from self-evident nature of many truths, we may reasonably ask for judges learned in the subterranean social dynamics of credibility, knowledge and expertise. If the way judges see the world shapes how others in the courtroom must see it, then judicial vision should be trained to acknowledge and criticize its own power to constrain social perceptions of the truth. Justice can no longer afford to be blind.

Notes

I am grateful to John Carson, Simon Cole, and especially Michael Lynch for their perceptive comments on an earlier draft of this paper. All transcripts cited in this article are available in the DNA Fingerprinting Archive at Cornell University (Ithaca, NY: Kroch

Library, Division of Rare and Manuscript Collections). This Archive was compiled with the support of a grant to Cornell University's Department of Science and Technology Studies from the National Science Foundation (Grant No. 93-12183).

1. These are the dates, respectively, of the beginning of the opening arguments in the criminal trial and of the jury verdict exonerating Simpson on all charges.
2. For a discussion of 'immutable mobiles', see Bruno Latour, 'Drawing Things Together', in Michael Lynch and Steve Woolgar (eds), *Representation in Scientific Practice* (Cambridge, MA: The MIT Press, 1990), 19–68.
3. Rachel Nowak, 'Forensic DNA Goes to Court with O.J.', *Science*, Vol. 265 (2 September 1994), 1352–54.
4. Elaine Lafferty with Martha Smilgis, 'The Inside Story of How O.J. Lost', *Time* (17 February 1997), 28–36.
5. The technique is described in Eric S. Lander, 'DNA Fingerprinting: Science, Law, and the Ultimate Identifier', in Daniel J. Kevles and Leroy Hood (eds), *The Code of Codes* (Cambridge, MA: Harvard University Press, 1992), 191–210.
6. *People v. Castro*, 545 N.Y.S. 2d 985 (Sup. 1989). Spurred by criticism from experts on both sides, the court held an extended evidentiary hearing and concluded that DNA typing was a scientifically reliable technique, but that it had not been conducted in accordance with generally accepted procedures in this particular case. As the first decision to exclude DNA typing in a criminal trial, *Castro* underscored the need for properly validated and standardized procedures. See also Lander, op. cit. note 5.
7. Office of Technology Assessment, *Genetic Witness: Forensic Uses of DNA Tests* (Washington, DC: US Government Printing Office, 1990).
8. National Research Council, *DNA Technology in Forensic Science* (Washington, DC: National Academy Press, 1992), and NRC, *The Evaluation of Forensic DNA Evidence* (Washington, DC: National Academy Press, 1996).
9. See, especially, three papers: Michael Lynch, 'The Discursive Production of Uncertainty: The OJ Simpson "Dream Team" and the Sociology of Knowledge Machine', *Social Studies of Science*, Vol. 29, Nos 5–6 (October–December 1998), 829–68; Arthur Daemmrich, 'The Evidence Does Not Speak for Itself: Expert Witnesses and the Organization of DNA-Typing Companies', ibid., 741–72; and Kathleen Jordan and Lynch, 'The Dissemination, Standardization and Routinization of a Molecular Biological Technique', ibid., 773–800.
10. Federal Judicial Center, *Reference Manual on Scientific Evidence* (Washington, DC: Federal Judicial Center, 1994), 272–329.
11. See the paper in this Special Issue by Saul Halfon: 'Collecting, Testing and Convincing: Forensic DNA Experts in the Courts', *Social Studies of Science*, Vol. 28, Nos 5–6 (October–December 1998), 801–28.
12. Kary B. Mullis invented a technique known as 'Polymerase Chain Reaction' (PCR) that permits minute sequences of DNA to be multiplied indefinitely. PCR revolutionized the speed and accuracy of DNA analysis and Mullis, with his bizarre ideas and unbuttoned lifestyle, became a cultural icon. See Emily Yoffe, 'Is Kary Mullis God? (Or just the Big Kahuna?)', *Esquire* (July 1994), 68–74.
13. Eric S. Lander and Bruce Budowle, 'DNA Fingerprint Dispute Laid to Rest', *Nature*, Vol. 371 (27 October 1994), 735–38, at 735.
14. Ellen Willis, 'The Wrath of Clark', *New York Times Book Review* (15 June 1997), 15 (reviewing *Without a Doubt* by Marcia Clark, chief prosecutor in the Simpson criminal trial).
15. Not everyone credits Simpson's so-called 'Dream Team' of defense lawyers with very much ingenuity, preferring to argue that it was the prosecution's incompetence that lost the case almost before it started. On this point, see the account by former Los Angeles Assistant District Attorney, Vincent Bugliosi, *Outrage: The Five Reasons Why O.J. Simpson Got Away with Murder* (New York: W.W. Norton, 1996). As we shall see below, however, the defense lawyers did succeed in bringing the jury into the potentially

arcane world of DNA typing by focusing on such mundane activities as sample collection and record-keeping.

16. This phrase was often used by Los Angeles District Attorney Gil Garcetti, under whose direction the prosecution built its case.
17. The Simpson murder case followed closely on the heels of the infamous trials of four white Los Angeles police officers for the brutal beating of Rodney King, an African-American man. The King case was a public relations disaster for the LAPD, especially after the defendant officers were acquitted by a suburban jury in the first trial. According to one line of conventional wisdom, relations between the LAPD and the African-American community were so poisoned by the time of the Simpson trial that even a perfectly conducted prosecution might not have resulted in a conviction. See *New York Times* (4 October 1995), A1.
18. It is hardly surprising that legal commentators have found relatively little to say about the Simpson jury's refusal to credit the DNA testimony. Race in general, and the personal racism of Detective Mark Fuhrman, a key prosecution witness, have been considered sufficient explanations for an outcome that, for the majority of white Americans, plainly beggared belief. But an irony lost sight of in the rush to accept the race-centred account is that the racial explanation itself was not neutrally distributed by race. It was white Americans for the most part who sought to rationalize an otherwise incomprehensible verdict in terms of race: black Americans, including members of the jury, insisted that the evidence had failed to support a guilty verdict. If race was the major factor in the case, then one of its most palpable effects was to make different racial groups perceive the scientific evidence differently. We are directed again to the question of what makes such discrepancies of vision possible.
19. The phenomenon of credibility has long been of interest to social scientists and has recently emerged as an important focus of inquiry in social studies of science. A partial listing of relevant work includes: Mary Douglas, 'The Social Preconditions of Radical Skepticism', in John Law (ed.), *Power, Action and Belief: A New Sociology of Knowledge?*, *Sociological Review Monograph* No. 32 (London: Routledge & Kegan Paul, 1986), 68–87; Augustine Brannigan and Michael Lynch, 'On Bearing False Witness: Credibility as an Interactional Accomplishment', *Journal of Contemporary Ethnography*, Vol. 16 (1987), 115–46; Steven Shapin, *A Social History of Truth* (Chicago, IL: The University of Chicago Press, 1994); Shapin, ' "Cordelia's Love": Credibility and the Social Studies of Science', *Perspectives on Science*, Vol. 3 (1995), 255–75.
20. Case studies and extended discussion on this point may be found in Sheila Jasanoff, *Science at the Bar: Law, Science, and Technology in America* (Cambridge, MA: Harvard University Press, 1995). See also Brian Wynne, 'Establishing the Rules of Laws: Constructing Expert Authority', in Roger Smith and Wynne (eds), *Expert Evidence* (London: Routledge, 1989), 23–55. Instructive, as well, is a recent spate of legal writing attacking critical legal studies and critical race theory in much the way that some scientists have attacked science studies: see, for example, Daniel A. Farber, *Beyond All Reason: The Radical Assault on Truth in American Law* (New York: Oxford University Press, 1997). Notable reviews of this work include: Richard A. Posner, 'The Skin Trade', *New Republic* (13 October 1997), 40–43; Alex Kozinski, 'Bending the Law', *New York Times Book Review* (2 November 1997), 7.
21. I use the term 'translations' here as it is used by sociologists of science to describe the moves by which pieces of the natural world are made tractable and believable in communities of scientific or technological practice. See, in particular, Michel Callon, 'Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St Brieuc Bay', in Law (ed.), op. cit. note 19, 196–233.
22. Legal scholars and practitioners disagree about the extent to which legal language should be black-boxed and transported from one case to another as fixed doctrine or dogma. Schools of legal interpretation differ, for instance, in their willingness to refer to a rule's original factual context in deciding whether or not to apply it to a new set of facts: see Robert S. Summers, *Instrumentalism and American Legal Theory* (Ithaca, NY: Cornell University Press, 1982). The difference between the relatively doctrinaire legal

realists and the more context-sensitive legal instrumentalists, however, is of degree rather than kind. In either case, language is seen as the primary instrument of persuasion. To acquire rule-like properties, common-law precedents necessarily have to shed their moorings in the messiness of specific facts, just as scientific claims have to cut loose from the contingencies of particular experimental and observational settings. In operating the 'literary technology' of the law, practitioners continually have to judge whether and how far they should deconstruct the applicable legal language.

23. In thinking about belief in the courtroom as a problem of information transfer and mediation (both verbal and visual), I take valuable cues from Bruno Latour: see, especially, Latour, 'On Technical Mediation – Philosophy, Sociology, Genealogy', *Common Knowledge*, Vol. 3, No. 2 (Fall 1994), 29–64; and his comparison of scientific and religious belief in Latour, 'Opening One Eye while Closing the Other ... A Note on some Religious Paintings', in John Law and Gordon Fyfe (eds), *Picturing Power: Visual Depiction and Social Relations*, *Sociological Review Monograph* No. 35 (London: Routledge, 1988), 15–38, and 'On the Assumptions of the Virgin Mary – A Meditation on Mediation', paper presented at the conference on 'Histories of Art – Histories of Science' (Boston & Cambridge, MA, November 1995).
24. The 'exclusionary rule' is a principle of modern American constitutional law, with historical roots in the late 19th century, that gives courts authority to exclude testimony obtained through constitutionally impermissible searches, such as those lacking a warrant or probable cause. For a scathing criticism of the modern rule, see Akhil Reed Amar, 'Fourth Amendment First Principles', *Harvard Law Review*, Vol. 107 (1994), 757–819. Amar's evaluation rests on a number of unexamined background assumptions, including the existence of an unproblematic category of 'reliable evidence' which judges should always endeavour not to exclude. Legal commentaries seldom afford much insight into authors' understandings of such concepts as truth and reliability.
25. The leading American case here is the Supreme Court's decision in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993).
26. Legal accounts of evidence-making can, of course, be quite illuminating, even when they do not dig deeply into the production of scientific claims, because they shed light on the common cultural resources that support the construction of scientific and social credibility. An excellent example of such work is Joseph Sanders, 'From Science to Evidence: The Testimony on Causation in the Bendectin Cases', *Stanford Law Review*, Vol. 46 (1993), 1–86.
27. Sheila Jasanoff, 'Judicial Construction of New Scientific Evidence', in Paul T. Durbin (ed.), *Critical Perspectives on Nonacademic Science and Engineering* (Bethlehem, PA: Lehigh University Press, 1991), 215–38.
28. Following David Bloor's influential methodological exposition, the key point, of course, is neither to privilege unquestioningly the claims about truth and falsity put forward by particular actors ('impartiality') nor to offer systematically different causal explanations for true and false beliefs ('symmetry'): David Bloor, *Knowledge and Social Imagery* (Chicago, IL: The University of Chicago Press, 2nd edn, 1991), 7.
29. See, for example, Simon Schaffer, 'On Astronomical Drawing', paper presented at the conference on 'Histories of Art – Histories of Science' (Boston & Cambridge, MA, November 1995).
30. For particularly illuminating treatments of the relationship between forms of witnessing and the exercise of power, see Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton, NJ: Princeton University Press, 1985), esp. 55–65; and Yaron Ezrahi, *The Descent of Icarus: Science and the Transformation of Contemporary Democracy* (Cambridge, MA: Harvard University Press, 1990), esp. 67–96.
31. Charles Goodwin, 'Professional Vision', *American Anthropologist*, Vol. 96, No. 3 (September 1994), 606–33.
32. Justice Orton is quoted in a novelistic account of the case by the crime writer Joseph Wambaugh: *The Blooding* (London: Bantam, 1989), 275.

33. Lander & Budowle, op. cit. note 13, 735.
34. Ian Fisher, 'Ruling Allows DNA Testing as Evidence', *New York Times* (30 March 1994), B1.
35. A new technique, 'Rapid Elimination Mass Screening' (REMS), has lowered these costs: Terry Kirby, 'Genetic Testing Breakthrough Allows Mass Screening of Suspects', and 'Faster Genetic Fingerprints Help Police', *The Independent* (London, 26 August 1991), 1, 6. Wambaugh cites a somewhat different figure (£72 for a two-hour blooding): op. cit. note 32, 209.
36. Wambaugh, op. cit. note 32, 214.
37. Among the formal techniques that the law employs for this purpose is the 'chain of custody', establishing the unbroken transfer of physical evidence from the location of the disputed events to the courtroom. A full-blown comparison of the mediations used to produce evidence in science and law could prove instructive.
38. On the importance of language and rhetoric in constructing scientific claims, see Peter R. Dear (ed.), *The Literary Structure of Scientific Argument: Historical Studies* (Philadelphia, PA: University of Pennsylvania Press, 1991).
39. This is the attribute of perception that the Japanese film-maker Kurasawa famously exploited in his classic work, *Rashomon*. On the partial and misleading nature of vision, see also G.K. Chesterton, 'The Man in the Passage', in *Father Brown Stories* (London: Folio Society, 1959), 52–69. Aptly enough for our purposes, the story turns on discrepancies in courtroom testimony by three equally credible witnesses: 'And the figure in the passage, described by three capable and respected men who had all seen it, was a shifting nightmare: one called it a woman, and the other a beast, and the other a devil . . .' (66). As *aficionados* of Father Brown will recall, each man had seen his own reflection in a mirror.
40. The classic account of inscriptions and their role in producing scientific facts is Bruno Latour and Steve Woolgar, *Laboratory Life: The Construction of Scientific Facts* (Princeton, NJ: Princeton University Press, 2nd edn, 1986), esp. 45–53, 89 (n 5), 244–46. Scientists, and for that matter other social actors, make choices in deciding how close to the visual signal they will stay in interpreting it: see Shapin (1995), op. cit. note 19, 264–67, and Trevor J. Pinch, 'Towards an Analysis of Scientific Observation: The Externality and Evidential Significance of Observational Reports in Physics', *Social Studies of Science*, Vol. 15, No. 1 (February 1985), 3–36. On the monopolistic and potentially unlegitimated character of such interpretations, see Shapin, ibid., and Zygmunt Bauman, *Intimations of Postmodernity* (London: Routledge, 1992).
41. Shapin & Schaffer, op. cit. note 30, 55–63. Boyle and his contemporaries drew analogies between experimentation and the legal process. The veracity of both, they noted, could be established by a multiplicity of witnesses, and right actions could be taken on the basis of knowledge so vindicated. Boyle apparently did not have in mind the particular conundrum that would be created by embedding the experimental space – a 'virtual' court of law – within a real legal proceeding, through the vehicle of expert witnessing. This, however, is the quotidian problem of modern law and modern science.
42. Latour, op. cit. note 2.
43. Inscriptions that appear to speak thus plainly to lay spectators may, of course, seem far more problematic to expert interpreters: see Jasanoff, op. cit. note 20, 128–29.
44. Advertising practices offer some evidence to the widespread cultural acceptance of fingerprints as markers of unique identity. Manufacturers of products such as cars and water faucets have employed fingerprints as part of the iconography that distinguishes their products from others. In 1985, the New York State Department of Taxation used the image of a fingerprint to announce an amnesty programme for tax evaders.
45. Simon A. Cole, 'Witnessing Identification: Latent Fingerprinting Evidence and Expert Knowledge', *Social Studies of Science*, Vol. 28, Nos 5–6 (October–December 1998), 687–712.
46. 533 So.2d 841 (Fla. App. 5 Dist. 1988), review denied 542 So.2d 1332 (Fla. 1989).

47. *Florida v. Andrews*, transcript of 20 October 1987 (testimony of Dr David E. Housman), 17.
48. 599 A.2d 960 (N.J. Super.L. 1991).
49. For an account of the technique's discovery, see Paul Rabinow, *Making PCR* (Chicago, IL: The University of Chicago Press, 1996).
50. *State of New Jersey v. Williams*, transcript of 7 May 1991 (direct examination of Dr Edward T. Blake), 43–44.
51. In modern democratic societies, both the natural and social sciences are therefore simultaneously engaged in creating and satisfying citizens' demands for legitimating demonstrations. See, for example: Ezrahi, op. cit. note 30; Helga Nowotny, 'Knowledge for Certainty: Poverty, Welfare Institutions and the Institutionalization of Social Science', in Peter Wagner, Björn Wittrock and Richard Whitley (eds), *Discourses on Society: The Shaping of the Social Science Disciplines*, *Sociology of the Sciences Yearbook*, Vol. 15 (Dordrecht: Kluwer, 1990), 23–41; Theodore M. Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Princeton, NJ: Princeton University Press, 1995).
52. *Williams* transcript, op. cit. note 50, 44.
53. Peter W. Huber, *Galileo's Revenge: Junk Science in the Courtroom* (New York: Basic Books, 1991), esp. 192–213; also see Jasanoff, op. cit. note 20, esp. 45–63, 206–10.
54. 293 F. 1013 (D.C. Cir. 1923).
55. Jasanoff, op. cit. note 20, 61–62.
56. 509 U.S. 579 (1993).
57. For further discussion of the *Daubert* criteria, see Kenneth R. Foster, David E. Bernstein and Peter W. Huber, 'Science and the Toxic Tort', *Science*, Vol. 261 (17 September 1993), 1509, 1614; Foster and Huber, *Judging Science: Scientific Knowledge and the Federal Courts* (Cambridge, MA: The MIT Press, 1997); Bert Black, Francisco Ayala and Carol Saffran Brinks, 'Science and the Law in the Wake of *Daubert*: A New Search for Scientific Knowledge', *University of Texas Law Review*, Vol. 72 (1994), 753–85; John L. Heilbron, 'The Affair of the Countess Gorlitz', *Proceedings of the American Philosophical Society*, Vol. 138 (1994), 284–316; Margaret G. Farrell, '*Daubert v. Merrell Dow Pharmaceuticals, Inc.*: Epistemology and Legal Process', *Cardozo Law Review*, Vol. 15 (1994), 2183–217; Sheila Jasanoff, 'Beyond Epistemology: Relativism and Engagement in the Politics of Science', *Social Studies of Science*, Vol. 26, No. 2 (May 1996), 393–418; Adina Schwartz, 'A Dogma of "Empiricism" Revisited: *Daubert v. Merrell Dow Pharmaceuticals, Inc.* and the Need to Resurrect the Philosophical Insight of *Frye v. United States*', *Harvard Journal of Law and Technology*, Vol. 10 (1997), 149–237; Anthony Z. Roisman, 'The Courts, *Daubert*, and Environmental Torts: Gatekeepers or Auditors?', *Pace Environmental Law Review*, Vol. 14 (1997), 545–76.
58. Sheila Jasanoff, 'What Judges Should Know about the Sociology of Science', *Jurimetrics*, Vol. 32 (1992), 345–59; Jasanoff, op. cit. notes 20 & 27.
59. *People v. Ojeda*, 225 Cal.App.3d 404 (1990); Jasanoff, op. cit. note 20, 59–61.
60. Goodwin, op. cit. note 31, 606.
61. Ibid., 619–22.
62. Michel Foucault, 'The Order of Discourse', in Robert Young (ed.), *Untying the Text: A Post-Structuralist Reader* (Boston, MA: Routledge & Kegan Paul, 1981), 48–78.
63. *The People v. Orenthal James Simpson* (hereafter cited as '*Simpson* trial'), video of pre-trial hearing, 27 July 1994 (author's transcription).
64. Ibid.
65. Shapin & Schaffer, op. cit. note 30.
66. Goodwin, op. cit. note 31, 606.
67. *Simpson* trial, videotape and transcript of admissibility hearing, 23 February 1995.
68. Ibid.
69. Ibid.
70. See, generally, Smith & Wynne (eds), op. cit. note 20. On the issue of DNA evidence and its deconstruction, see Jasanoff (1992), op. cit. note 58, and Jasanoff, op. cit. note 20, 55–57.

71. The issue subsequently provoked considerable interest in the letter columns of *Science*: see 'DNA Fingerprinting' (Letters), *Science*, Vol. 247 (2 March 1990), 1018–19.
72. Lander & Budowle, op. cit. note 13, 735.
73. I am here drawing on, but also extending, the valuable work in science studies on scientists' repertoires of challenge and justification: see, in particular, G. Nigel Gilbert and Michael Mulkay, *Opening Pandora's Box: A Sociological Analysis of Scientists' Discourse* (Cambridge: Cambridge University Press, 1984); H.M. Collins, *Changing Order: Replication and Induction in Scientific Practice* (London: Sage Publications, 1985).
74. This is not to say that there is any universal agreement among scientists, or presumably among laypeople, as to what constitutes an adequate control in experimental practice: see Sheila Jasanoff, *The Fifth Branch: Science Advisers as Policymakers* (Cambridge, MA: Harvard University Press, 1990), 75–76.
75. Zachary R. Dowdy, 'A Ruling vs. DNA Evidence', *Boston Globe* (12 March 1996), 1.
76. Consider, for example, the different standards for scientific misconduct that came into play during the investigation of MIT biologist Thereza Imanishi-Kari in the so-called Baltimore case: Daniel Kevles, 'The Assault on David Baltimore', *New Yorker* (27 May 1996), 94–109.
77. Shapin (1995), op. cit. note 19, 268–71. My views here run counter to those of Luhmann and Giddens, as represented by Shapin.
78. Standardized collection methods are equally essential to the project of making credible scientific data, inscriptions, and measurements out of nature's raw materials. For more on this point, especially on the significance of protocols and logbooks, see Bruno Latour, 'The "Pédofil" of Boa Vista', *Common Knowledge*, Vol. 4, No. 1 (Spring 1995), 144–87.
79. The manual in question apparently was an edition of Barry A.J. Fisher, *Techniques of Crime Scene Investigation* (New York: Elsevier, 5th edn, 1992).
80. *Simpson* trial, transcript of 12 April 1995 (testimony of Dennis Fung).
81. Lander & Budowle, op. cit. note 13, 735.
82. Jeffrey Toobin, 'Ito and the Truth School', *New Yorker* (27 March 1995), 42–48. As the trial wore on, straining patience as well as resources, Toobin's flattering picture of Ito yielded to a more ambivalent one that stressed his indecisiveness and lack of energy.
83. Jasanoff, op. cit. note 20, 66–67, 221–22.
84. AAAS-ABA National Conference of Lawyers and Scientists, 'Enhancing the Availability of Reliable and Impartial Scientific and Technical Expertise to the Federal Courts', Report to the Carnegie Commission on Science, Technology and Government (Washington, DC, September 1991).
85. Lord Harry Woolf, *Access to Justice: Final Report* (London: HMSO, 1995).
86. 139 L.Ed.2d 508 (1997).
87. Bruno Latour, *Science in Action* (Cambridge, MA: Harvard University Press, 1987), 96–100.
88. See, for instance, Rorty's claim that the 'hardness of fact ... is simply the hardness of the previous agreements within a community about the consequences of a certain event': Richard Rorty, 'Texts and Lumps', in his *Objectivity, Relativism, and Truth* (Cambridge: Cambridge University Press, 1991), 78–92, at 80.

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