5 Expert Games in Silicone Gel Breast Implant Litigation

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Legal historians have noted the relatively late appearance of institutionalized medicolegal knowledge and practices in Anglo-American judicial proceedings.[1] Here at the end of the 20th century, however, the American legal system suffers if anything from a surfeit of expertise. Courts today are awash with scientific evidence, generated largely at the behest of the litigating parties. Forensic science figured crucially in a series of high-profile criminal cases during the 1990s: the identification of telephonic voices (New York State Judge Sol Wachtler's threatening calls to his ex-mistress); handwriting (White House aide Vince Foster's suicide note and the Jon-Benét Ramsey ransom letter); typewriting (Theodore Kaczynski's authorship of the Unabomber manifesto); blood spatters (O.J. Simpson's glove, shoes and car); traces of chemical explosives (the Oklahoma City bombing); intercranial bleeding and 'shaken baby syndrome' (the murder trial of British au pair Louise Woodward). In civil cases, scientific evidence underpins claims of damage from drugs, diet pills, medical devices, electromagnetic fields, environmental pollutants and a host of other hazards, imagined or real. Expert evidence is invoked not only to prove guilt and causation, but also to establish baselines of acceptable behaviour in far-flung domains of professional endeavour, as in cases involving medical malpractice, insider trading, scientific misconduct, nursing, babysitting or child abuse.

As if driven by the law of supply and demand, forensic science, the cluster of scientific specialisms dedicated to the investigation of legally relevant matters of fact, has undergone massive growth and diversification in the past few decades. Indicators of professionalization, such as treatises, journals and associations, have not lagged far behind. A recent 1241-page treatise on scientific evidence testifies to the breadth and depth of this transformation. Its index lists, under a single letter of the alphabet, topics as disparate as 'semen', 'shoewear', 'skeleton', 'skidmarks' and 'smothering'.[2] Similarly

hardly an academic discipline has not been called upon at one time or another to satisfy the legal system's insatiable thirst for certified knowledge. Sociologists and philosophers of science, for example, testified against the constitutionality of an Arkansas creationist law,[3] and specialists in ancient philosophy debated the constitutionality of an anti-gay rights referendum in the state of Colorado.[4]

The sudden efflorescence of experts and expertise in legal settings has brought with it a rising concern about the lines of demarcation between genuine and spurious experts, between mere claims of expert knowledge and the real thing. The fairness, not to say the perceived competence, of the legal process depends on its ability to make just such demarcations, but the capacity of courts to do so credibly is increasingly in doubt. For some, the problem reduces to a search for rules or criteria with which courts should be able to distinguish, quite generally, between legitimate science and its meretricious lookalikes.[5] Others have put their faith in process over rules and urged courts to assess the state of knowledge through wider use of specially appointed experts or panels. But such formulaic solutions, as has been argued elsewhere,[6] fail to make allowances for the contingencies that govern the production of scientific evidence. In the great majority of modern legal controversies, relevant expertise is not to be had for the asking, conveniently displayed in well-marked packages in the grand supermarket of science. Like every other aspect of a litigant's story, expert evidence too must be painstakingly pieced together from disparate, contradictory, incomplete and changeable sources.[7] Its function from the start is to support or contest particular accounts of something gone wrong in the world; normative and epistemological commitments are therefore inseparably woven together into expert evidence.

How then should courts tackle the demarcation problem of distinguishing between 'good' and 'bad' expert testimony? If appeal to external scientific authority is excluded in principle, whether in the form of absolute rules or of authoritative processes, clarification has to be sought within the very settings where evidence is made, through a deeper understanding of the mechanisms by which experts gain or lose credibility in the eyes of the law. Expertise is best viewed for our purposes as the end product of a complex game – equipped with its own distinctive moves, countermoves, rhetorics and practices – which can be simultaneously played by multiple players (such as judges, juries, lawyers, scientists, witnesses and professional communities) at varied locations, inside and outside the courtroom. This dynamic model helps us to sort and compare the divergent claims of expertise that come before the courts in complex litigation, such as the silicone gel breast implant (SGBI) lawsuits that have flooded US courtrooms since 1977.[8] Appreciation of the model, finally, provides a basis for refining the

judgments that should govern the admissibility of expert evidence in legal proceedings.

How to Tell an Expert

In everyday life, expertise strikes us as an unproblematic phenomenon with clearly defined boundaries. The word 'expert' has, to begin with, a respectable pedigree in the English language. According to the *Oxford English Dictionary*, Chaucer already spoke of a person 'in science so experte' and of 'Maystres ... That were of lawe expert and curious'. We have, besides, quite clear intuitions about how to use the term in ordinary speech. A cook, a salesman or a piano tuner, for instance, can be designated 'expert' for simply measuring up to certain conventional performance standards. By contrast, it seems reductionist to pin the label 'expert' on a violinist, mathematician or theatre critic, whose craft transcends any predetermined repertoire of rules. Yet we readily concede that artists, inventors and technicians all possess some form of expertise. Rule 702 of the US Federal Rules of Evidence (Testimony of Experts) begins to tease apart some of these intuitive judgments by acknowledging the varied ways in which expertise can be constituted. Persons may be recognized as experts in the courtroom by virtue of 'knowledge, skill, experience, training, or education'; once they are so certified, they need not, like laypeople, limit their testimony solely to matters known through direct, personal experience. Expertise, as conceived by the law, clearly encompasses the special sort of competence that we term 'science', but it is a significantly broader concept.

While granting that there are varied cognitive and experiential pathways to expertise, Rule 702 does require all would-be experts to show some level of learning or mastery beyond the ordinary. Expertise is not a state to be claimed at will. Yet, in the landscape of contemporary legal disputes, it seems that almost any kind of human experience can be converted, if only temporarily, into a domain of possible expertise. Scientists, used to operating within tightly drawn boundaries of professional authority,[9] find this catholic embrace of expertise unsettling, to say the least. Is the courtroom, then, the proverbial country of the blind where even the one-eyed man is king? The answer, of course, is no. The legal system has as great a stake in distinguishing admissible from inadmissible claims of expertise as science itself. In testing the credibility of experts, the law reaffirms its own credibility. The ways in which it does this, however, are all its own, conditioned by the legal system's peculiar needs, constraints and purposes. Consequently the law's techniques for evaluating scientific evidence do not map neatly onto science's modes of testing knowledge claims. Contrary to conventional wisdom, these

discrepancies do not make the law anti- or un-scientific; they merely accentuate the necessary distance between legal and scientific fact finding.

Formal screening of experts has long been a component of legal proceedings. The American federal system determined admissibility for 70 years in accordance with an otherwise obscure 1923 appeals court decision, *Frye* v. *United States*,[10] which decreed that the science underlying expert testimony had to be 'sufficiently established to have gained general acceptance in the particular field in which it belongs'. The *Frye* rule proved difficult to administer consistently, and over time different interpretations of 'general acceptance' took hold in different jurisdictions around the country. Despite this lack of uniformity, the basis for screening experts did not attract much attention outside the legal community until the 1993 Supreme Court decision in *Daubert* v. *Merrell Dow Pharmaceuticals, Inc.*,[11] which many hailed as the case that would liberate federal courts from an onslaught of 'junk science'. *Daubert* overruled *Frye*, holding that it had been superseded by the legislatively enacted Federal Rules of Evidence. Federal courts, the Supreme Court declared, should henceforth subject offers of expert testimony to two basic tests: that of 'fit', or relevance, and that of scientific reliability. To assist the lower courts in applying the latter test, the court proposed four criteria: (a) did the evidence rest on a tested and falsifiable theory or technique; (b) had the underlying science been peer reviewed; (c) what was the technique's error rate, if known; and (d) recapitulating *Frye*, was it generally accepted?

In the glare of publicity surrounding *Daubert* and the efforts to apply it, the moves that legal actors make in constructing experts and expertise have become much more transparent than they were in the shadowy *Frye* regime. Federal judges appear substantially less inclined in the post-*Daubert* era simply to defer to the parties' experts. Rather courts have sought actively to test the relevance and reliability of expert testimony, through proceedings in which expertise is dynamically constructed and deconstructed. Some of the tests applied in screening experts are explicit and rule-like, as *Daubert* contemplated, and have become the subject of vigorous debate and commentary. Others are tacit, invisible, contingent and so unreflectively applied that they elude systematic inquiry. At the same time, the screening process has become palpably more interactive. Judges do not unproblematically apply the legally sanctioned demarcation criteria to a well-defined set of factual possibilities. Instead they (and, where applicable, their appointed experts) respond to specific, situated and strategic moves made by the litigants to establish some expert claims and deconstruct others. By piecing together these cross-cutting manoeuvres, we gain insight not only into what counts as expertise in American law but also into the merits of competing approaches to demarcating expertise.

The Game of Expertise

The making of expertise within the legal process can usefully be conceptualized as a kind of game in which experts and their claims struggle for credibility in the eyes of the fact finder. As in any game, some of the moves have to be made in accordance with prescribed rules; others are left to the players' wit and imagination. Figure 5.1 lays out the central parameters of the expertise game on an imaginary board divided into four quadrants by a horizontal and a vertical axis. The horizontal axis – labelled *experience* – accommodates moves designed to professionalize the knowledge claimed by expert witnesses. It is not enough for experts simply to embody personal trustworthiness, although this of course is a *sine qua non* of witnessing more generally. In order to claim the special prerogatives that the law accords them, experts have to embody in their own persons the collective judgments of a discipline, occupation or profession. Their success depends on establishing a double claim on the fact finder's trust: not only as individuals, but also as representatives of certified specialist communities. Correspondingly their credibility can be undermined by attacking either their personal or their professional integrity.

The vertical axis – labelled *objectivity* – designates efforts to move expert evidence from the pole of untested or subjective observation (for example, eyewitness testimony) towards that of scientific fact. Expert testimony gains special force when it is seen as conforming to scientific standards. The expert's personal biases and faults then diminish in significance, although (as will be clear in later examples) the personal dimension never completely disappears. An expert who represents science speaks for a reality presumed to be beyond mere individual experience. The more scientific the claim, the less open it is to personalized attack. Its objectivity is underwritten by science's cultural authority. Following *Daubert*, however, judicial scrutiny can less readily be avoided simply by asserting that testimony is based on reliable science. The labels 'scientist' and 'scientific' have become resources to be strategically deployed, defended and fought for vis-à-vis the judge as well as the opposing party. The vertical axis in Figure 5.1 delineates the moves by which witnesses' claims can either be made to look more like science or else methodologically deconstructed and rendered inadmissible as scientific testimony.

Together, the two axes define the basic strategic spaces in which expertise can be asserted or challenged. Proceeding clockwise from the top left, the first three quadrants all represent spaces in which expertise can be plausibly claimed, but on varying grounds: in quadrant 1, the goal is to enhance the objectivity of lay experience by stressing its skilled, disciplined or knowledgeable character; in quadrant 2, moves are designed to tie expertise

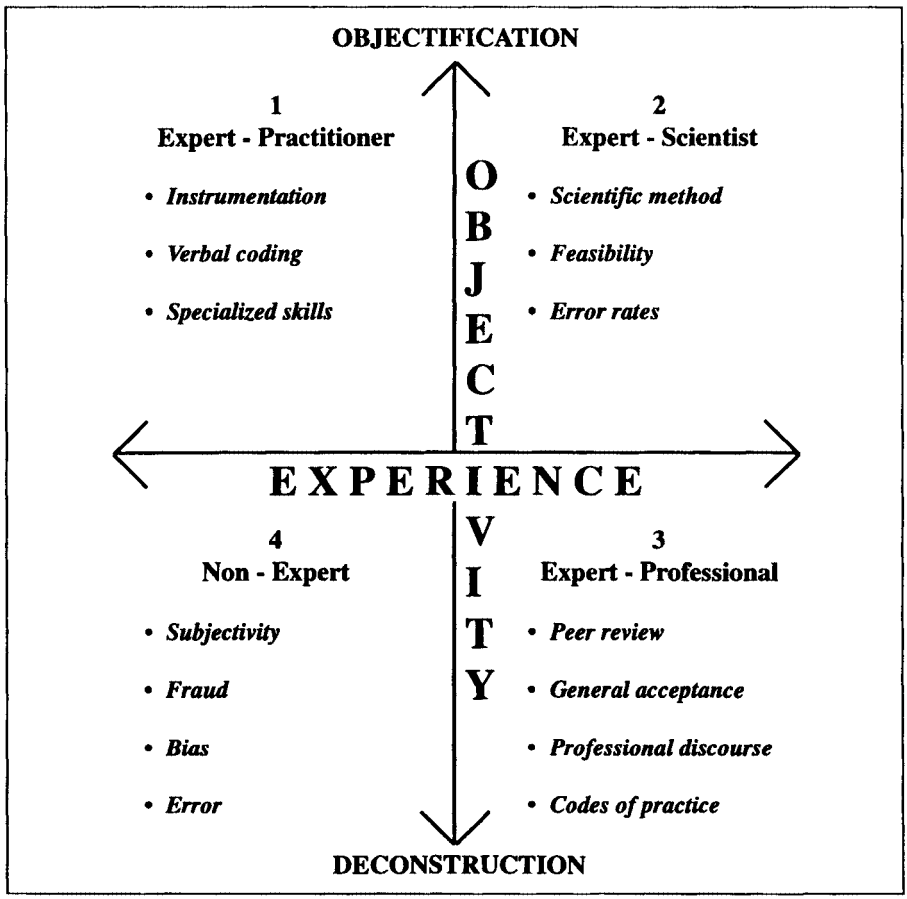

Figure 5.1 Game board of expertise

explicitly to scientific methods and the objectivity of science; in quadrant 3, expert claims are linked to the judgment and experience of professional communities, but not necessarily to science. In quadrant 4, by contrast, the permitted moves are largely deconstructive: to deprive experts of the resources of specialized 'knowledge, skill, experience, training or education'. The would-be expert is reduced here to the status of a lay witness of no special skill and questionable personal integrity. To succeed in the expertise game, players must press their claims as far as possible in the direction of scientific objectivity and accredited professional experience. In challenging expert claims, the goal is just the opposite: to move claims into

quadrant 4, that is, back towards the poles of subjective knowledge and individual experience. Only when pressed into this space can expert claims be said to meet neither the relatively stringent tests of scientific reliability nor the broader measures of professional expertise.

Interpreted within the model of the expertise game, *Daubert* acquires a more complex meaning than it has been accorded by most commentators. It is not, as is sometimes asserted, simply an injunction to judges to 'think like scientists'. Rather, *Daubert* outlines a programmatic view of the possible means by which allegedly expert claims can be moved along one or the other major axis of knowledge certification. The criteria proposed by the Supreme Court are consistent in this respect with the eclectic approach to expertise taken by the Federal Rules of Evidence. *Daubert* implicitly recognizes that expert knowledge, for legal purposes, is not coextensive with scientific knowledge. Of the four *Daubert* criteria, only two (testability and error rates) refer specifically to moves along the *objectivity* axis, by which experts lay claim to scientific reliability; the other two criteria (peer review and general acceptance) refer to moves along the axis of *experience*, from personal to professional, but not necessarily scientific, knowledge.

Daubert did not aim to provide comprehensive rules for establishing expertise and it should not be construed as having done so. The model of the expertise game helps identify some of the gaps in the criteria. 'Falsifiability', for instance, is derived from the philosopher Karl Popper's model of experimental science and has little relevance for other forms of scientific activity. Furthermore none of the criteria explicitly takes account of the role of material resources - such as instruments, reagents, test animals, photographs, software or computerized databases - in producing 'objective' scientific knowledge, even though their pervasiveness in scientific practice is now widely acknowledged.[12] Similarly no mention is made of professional codes or formal research protocols that can be used to underwrite claims of professional knowledge. The criteria, finally, assume a degree of autonomy on the part of judges that does not square with the interactive and locationally dispersed character of the expertise game. The opinion shows neither a reflexive awareness of the judicial role in constructing different meanings of admissibility nor a sensitivity to the ways in which legal discourse might be incorporated into the production of supposedly objective scientific statements. We will return to these points below in connection with the moves made by litigating parties in the SGBI cases.

Playing by the Rules

The layout of Figure 5.1 allows cases involving expert claims to be sorted

into four 'bins', defined on the one hand by the source of the claimed experiential authority (personal or professional) and on the other by the choice to defend or contest claims of facticity (objectification or deconstruction). In each bin or quadrant, a finer characterization can be produced by describing the specific pathways followed in building up or tearing down the claims of expertise. Was the expert's experience shown to conform to impartial professional standards or was it challenged as idiosyncratic, wrong or biased? Was expert knowledge validated by the test of falsifiability or by that of general acceptance? The metaphor of sorting into bins scarcely does justice to the intricate dynamics of actual cases, which involve simultaneous, competing moves by several actors. In the game of expertise, the contest rarely takes place along preordained positions and stationary battle lines. Winning strategies more often require flexible accommodation to choices made by other players claiming superior scientific or professional authority.

The broad category of toxic tort cases, for instance, can be seen in the light of this analysis as composed of contests between plaintiffs' experts wishing to position themselves in quadrant 2 (upper right), or failing that in quadrant 1, and defendants seeking to press their opponents into quadrant 4 (lower left). An instructive example is *Christopherson* v. *Allied Signal Corp.*,[13] in which a suit was brought on behalf of a deceased worker at a battery manufacturing plant in Waco, Texas. The plaintiffs claimed that Christopherson had contracted a rare and fatal form of small-cell colon cancer as a result of exposure to nickel and cadmium fumes at his workplace. The only expert testimony provided for the plaintiff was based ultimately on an affidavit by a co-worker, whose testimony the court rejected as lacking sufficient markers of reliability: 'We find particularly telling', the court opined, the 'admission in his deposition that he did not know the chemical composition of the fumes nor the mix of chemicals in the impregnation and soak tanks'.[14] Other missing elements included quantitative data on the size of the plant and the soak area, the ventilation system and the dosage and duration of exposure; all these could presumably have been gathered through appropriate instrumentation, but not through unmediated observation. Faced with these gaps, the court concluded that the co-worker's subjective experience of his working conditions could not be packaged as expert testimony.

Skilful deployment of instruments can help clothe individual observations in the guise of credible expertise (quadrant 1), even when no professional warrant is available for particular ways of seeing. Thus, in *People* v. *Marx*,[15] a 1975 California criminal case, a court admitted evidence of bite marks on the victim's body although such testimony was not supported by an 'established science of identifying persons from bite marks'. The court

applauded the prosecution experts' 'enthusiastic response to a rare opportunity to develop or extend forensic dentistry into the area of bite mark identification'.[16] Especially persuasive in the court's view was the fact that the experts 'did not rely on untested methods, unproven hypotheses, intuition or revelation. Rather, they applied scientifically and professionally established techniques – X-rays, models, microscopy, photography' to produce data that were independently 'verifiable by the court'.[17] Accordingly the court felt competent to rule that the novel uses of these techniques by prosecution experts raised no serious issues of admissibility.

Not only material instruments, but discursive strategies can be used to rerepresent personal observations as knowledge grounded in professional experience (quadrant 3). In the first Rodney King trial, for example, an 'expert' on police practice persuaded the jury to see a videotape of police violence as experienced policemen allegedly would have seen it. He accomplished this sleight of vision by verbally coding the movements of the victim's body: almost invisible changes in the position of arms, legs and buttocks were classified by these means as 'aggression', calling forth, in turn, such graduated and calculated responses as 'assessment periods', 'escalations of force', 'kicks' and 'blows'.[18] Similar verbal coding has been used with greater and lesser success to convert visual tests of car drivers' sobriety, such as 'horizontal gaze nystagmus', into techniques of expert policing.[19] Appeal to contingently constructed, yet seemingly impersonal, assessment rules can equally be made the basis for rejecting expert claims. An example that gained considerable notoriety in the United States was the idealized code of practice against which the criminalist Denis Fung was measured and found wanting under cross-examination by Barry Scheck in the O.J. Simpson trial. A lesser known but no less revealing example is the list of 'qualifications of expert witnesses in ancient Greek thought' produced by the philosopher Martha Nussbaum in connection with her testimony in the Colorado gay rights trial; by codifying the prerequisites for responsible classical scholarship, she hoped to place some interpreters (and interpretations) of Plato outside the pales of credible expertise.[20]

In quadrant 4 (lower left), we find strategies for moving claims down the objectivity axis, through deconstruction of their scientific merit, or back along the horizontal axis from professional to personal, and hence not qualifying as expertise. Since *Daubert*, for example, sceptical deconstruction of peer review appears to be gaining ground. In a federal district court case, *Valentine* v. *Pioneer Chlor Alkali*,[21] the court rejected an expert's testimony on the neuropathological effects of chlorine inhalation even though he had published an article in a peer-reviewed journal. In explaining its decision, the court produced its own demarcation criterion. Editorial peer review, the judge concluded, was not legally cognizable as 'true' peer review:

'Militating against forensic use of editorial peer review as a proxy for genuine critical examination of purported scientific evidence is the fact that the average referee spends less than two hours assessing an article submitted to a biomedical journal'.[22] When the *Daubert* case itself was reconsidered following the Supreme Court's 1993 decision, the Ninth Circuit Court of Appeals engaged in a similar construction of case-specific demarcation criteria. To strengthen the case for admissibility, it held, scientific evidence should be based where possible on 'pre-litigation research', which is 'less likely to have been biased toward a particular conclusion by the promise of remuneration'. Such a foundation would help to counter charges that the evidence in question 'is not science at all, but litigation'.[23] This ad hoc and unsupported rule was adopted with alacrity by the SGBI defendants, as we shall see below.

Personal integrity is another possible focus of attack in quadrant 4. This is where cross-examination can be deployed to great effect, by revealing personal bias, misconduct, financial interest or inconsistency on the part of individual experts. In the courtroom, the expert's personal credibility is always at stake and the claimed authority of science guarantees no protection against such probing. In *Blum* v. *Merrell Dow Pharmaceuticals, Inc.*,[24] for example, a products liability case involving the drug Bendectin, a Pennsylvania trial judge pointed to defects in the defence experts' professional integrity (evidence of bias in peer review) as well as personal integrity (corporate funding of research) as the basis for downgrading their credibility.

The testimony demonstrated that articles were inserted in 'peer review' journals, without review by independent authorities, but edited by lawyers; that 'peer review' journals published, as valid, the results of 'less than good studies'; that articles were rejected for publication by prestigious journals before being published in the 'peer review' journal, *Teratology*. The testimony exposed scientific literature created for purposes of legal defence. The testimony revealed a sycophantic relationship between 'scientists' and their funding source: the defendant, Merrell Dow.[25]

With this range of illustrations in mind, let us turn now to the construction of expertise by players in the litigation concerning breast implants.

The SGBI Litigation: Birth of a Mass Tort

Silicone gel breast implants were first introduced into the American market in the early 1960s as substitutes for earlier, less satisfactory devices, such as wax, fabric, directly injected silicone, synthetic sponges or saline-filled implants. The new product was favoured for its appearance, physical

stability and apparent non-reactivity. By the 1970s, SGBIs were in wide use for cosmetic breast augmentation as well as for breast reconstruction following cancer surgery. Some 20 years later, reasonable estimates for the number of women with breast implants ranged between one and two million, with more precise figures probably not ascertainable.[26] SGBIs were marketed before the enactment of the 1976 Medical Device Amendment to the Federal Food, Drug and Cosmetic Act which required safety and efficacy testing for all implants. Information about the devices' safety was therefore largely the product of anecdotal and ad hoc post-market reporting by users, medical professionals and the media, a problem that was later to plague both plaintiffs and manufacturers. After 1976, SGBIs were subject to review by advisory panels to the Food and Drug Administration (FDA), the regulatory agency whose task it was to decide whether to demand additional testing or to leave the devices on the market. By all indications, FDA exercised its review power lackadaisically and without serious conviction throughout the 1980s.

Starting in the late 1980s, the breast implant story took surprising new turns. There were, to begin with, incontrovertible reports of rupture and leakage from the implants, accompanied by local inflammation, painful scarring, contraction and hardening of the surrounding breast tissue. Even intact implants were prone to 'bleeding', permitting small quantities of silicone to escape and be gradually disseminated through the body. For many women, the localized responses alone were severe enough to necessitate surgical removal of the implants, a procedure that some underwent more than once in the hope of finding a workable solution. More troubling were the increasing reports of so-called 'connective tissue diseases' (CTDs), a collection of auto-immune disorders afflicting the joints, skin and internal organs that included such conditions as lupus, scleroderma and rheumatoid arthritis. Complaints of this gravity could not stay hidden. In December 1990, the CBS television reporter Connie Chung produced a segment on breast implants on her show, *Face to Face with Connie Chung*. She offered 'shocking' revelations of implant-induced disease and charged the FDA with lax regulation and failure to inform women of the risks to their health. Concurrently suits by women with implants began to reach the courts in substantial numbers and with large financial consequences. In December 1991, a federal jury awarded an unprecedented $7.34 million (including $6 million in punitive damages) to a California woman who claimed that she had developed 'mixed connective tissue disease' because of her implants.[27]

Partly in response to these events, regulatory pressure on SGBIs tightened in the early 1990s. Dr David A. Kessler, then FDA Commissioner and an ardent public health activist, requested the agency's General and Plastic Surgery Devices Panel to assess the safety of breast implants. The panel's

scientific review, rounded out with three days of contentious, highly charged hearings in November 1991, concluded that not enough information was available to establish the safety of the devices, but that they should remain on the market pending further study. On 6 January 1992, however, Kessler requested a voluntary moratorium on the use of SGBIs to permit the review of additional data obtained from manufacturers in the course of litigation. In its report of April 1996, the FDA advisory panel reaffirmed that the connection between silicone gel and CTDs was not yet scientifically established but recommended restrictions on access to implants while clinical trials were conducted.[28] Acting on these recommendations, the FDA immediately restricted the use of implants to reconstruction after cancer surgery; the agency also proposed strict guidelines for new clinical trials of SGBIs.[29]

The moratorium and its aftermath confirmed many implant recipients' worst suspicions about their health complaints, and the steady trickle of SGBI lawsuits around the country soon turned into a torrent. Manufacturers and plaintiffs alike were caught up in one of the most distinctive, frustrating and messy inventions of the modern American legal system: the mass toxic tort. The total number of SGBI claimants was known to exceed 440 000. Dow Corning Corporation, the market leader in implant sales, recognized that extreme measures were needed to deal with its potential liability. Settlement emerged as the most attractive option for Dow Corning as well as its major competitors. By late 1994, federal procedures for multi-district litigation were used to consolidate some 9600 claims for pretrial proceedings in the Northern District of Alabama. In September of that year, Chief Judge Samuel C. Pointer, Jr shepherded the parties into a $4.25 billion global settlement, with Dow Corning agreeing to pay some $2 billion of that amount.[30] For some months, it seemed that the controversy might actually close, but that impression proved to be illusory.

Several factors contributed to the unravelling of the first SGBI settlement in the following months. To begin with, too many plaintiffs opted not to participate in the global settlement, including most of the Texas claimants, accounting for almost one-quarter of the total number of litigants. Faced with massive uncertainty about the extent of its liability, Dow Corning filed for bankruptcy in May 1995. Science, too, began to emerge as a separate force in the SGBI story, as data became available from the first systematic studies of women with breast implants. On 16 June 1994, the *New England Journal of Medicine* (*NEJM*) published the results of the first clinical trial investigating the correlation between silicone implants and connective tissue diseases.[31] Conducted by the respected Mayo Clinic in Minnesota, this retrospective cohort study compared 749 women who had received SGBIs between 1964 and 1991 with twice that number of women in a control group

and found no statistically significant increase in CTDs among the former. The Nurses' Health Study, a Harvard-based survey of some 100 000 present and former nurses, appeared to confirm the Mayo Clinic findings, as did several other studies that followed. As both litigation and scientific research inexorably continued, judges and litigants had to decide how to accommodate the emergent and allegedly independent voice of science into their legal strategies. The model of the expertise game provides a useful framework for analysing the resulting manoeuvres on all sides.

Law Meets Science: Experts in Action

Of the many different fora, both state and federal, in which SGBI lawsuits continued to make headway, two attracted special notice for their innovative approach to expert testimony. The first, *Hall* v. *Baxter Healthcare Corp.*,[32] unfolded in a federal district court in Oregon under Judge Robert E. Jones; the other was the federal multi-district litigation, MDL-926, which continued to play out in Judge Pointer's court in Birmingham, Alabama after the breakdown of the original settlement. Central to both proceedings was the attempt to construct an authoritative picture of implant-related disease, a problem that both courts addressed by appointing independent scientific panels to review and sift the available evidence. As of late 1997, the Pointer panel was still conducting its inquiry, whereas Judge Jones had made legal history in *Hall* by ruling inadmissible all of the plaintiff's evidence supporting the claim of silicone-induced CTD. For our purposes, however, it is the contrast between the two court-initiated processes and associated moves by litigants that is of greatest interest. Differences in the strategies adopted by the judges and the parties in the two courts provide compelling insights into the game-like character of legal expertise: even in the post-*Daubert* era, remarkably few moves are fixed in advance, and the scientific stories constructed in the courts bear the unavoidable stamp of judicial predilection.

In Search of Neutrality

In appointing independent experts to assist them, courts are institutionally concerned, first and foremost, to ensure neutrality with respect to the outcome of the lawsuit. Financial connections with the parties are an immediate disqualifier, as is – ordinarily – evidence of overly close professional or personal relations between experts and parties. Both the *Hall* and the MDL-926 proceedings took pains to screen the court-appointed

experts against outright bias, but the methods chosen were far from identical. To identify suitable experts (ultimately, four in number) for the panel in *Hall*, Judge Jones appointed a single special master, Dr Richard T. Jones, who was as it happens the judge's cousin, but also a highly regarded emeritus professor of biological sciences at Oregon Health Sciences University.[33] Judge Pointer's approach was considerably more measured and elaborate. He took over from a group of judges in New York the idea of appointing a *panel* of special masters to designate the MDL-926 expert panel. Six distinguished academic scientists and law professors, each carefully screened for possible hidden financial interests in the case, eventually advised Judge Pointer on the selection of his four expert panellists.

To what extent did these processes actually guard against bias? One notes immediately that *cognitive* bias or interest apparently received less attention from both judges than possible pecuniary interests. The plaintiffs in *Hall*, for example, argued that Judge Jones himself was a source of bias potentially overriding any efforts to secure the neutrality of his expert advisers. The judge's wife had been satisfactorily fitted with implants following cancer surgery in the late 1970s, a fact that Judge Jones acknowledged but did not see as sufficient to warrant recusing himself:

> That doesn't mean that I will admit all evidence as proffered or exclude all evidence as proffered. I will just look at whatever the state of the art is. And that keeps moving all the time, as we all know. But I did want to make that disclosure. And if that creates any problems for anybody, why that's up to you. But I am not going to recuse myself on these cases because of that.[34]

This public confession evidently secured the judge's personal credibility, although his subsequent decision to exclude all of the plaintiffs' evidence was widely seen as unorthodox, unprecedented and a likely overstepping of the admittedly fuzzy line between permissible judicial screening and impermissible judicial fact finding.

A more interesting issue of potential cognitive bias arises in connection with the divergent mapping of the relevant scientific fields by the two expert panels. The *Hall* panel included an epidemiologist, a rheumatologist, an immunologist–toxicologist and eventually a polymer chemist;[35] the MDL-926 panel also covered the areas of epidemiology, rheumatology, immunology and toxicology, but not polymer chemistry.[36] Such differences in scientific coverage are not exactly unprecedented in the annals of evidentiary proceedings. Under the *Frye* rule, courts had frequently disagreed in identifying the 'particular fields' in which novel scientific evidence belonged. Could the reliability of polygraphy, for example, be adequately certified by skilled polygraphers or was additional testimony

required from one or more scientific fields, such as neurology, psychiatry and physiology?[37] No clear consensus ever emerged, and excessive scope for judicial boundary drawing came to be recognized as a weakness of *Frye*.

Proceedings designed to establish definitive causal stories under *Daubert* give rise to similar dilemmas. The choice of experts and the fields they represent cannot be dismissed as merely incidental: it goes to the heart of what the fact finder views as contested or as taken for granted. The absence of a chemist on the MDL-926 panel signalled, in effect, that questions about the chemical properties of silicone gel did not merit 'neutral' review. Yet a substantial part of the plaintiffs' argument in *Hall* and other SGBI cases has centred on silicone chemistry, with analogies drawn between silicone gel and silica, a substance known to be associated with auto-immune diseases in exposed workers.[38] Were the two courts, we may ask, seeking to adjudicate the 'same' case through their differently constituted expert panels?

Framing Choices: An 'Atypical' Disease?

That question resonates all the more forcefully when one considers the framing of the plaintiffs' health claims in the two proceedings. Frustrated by epidemiological studies that found no significant increase in CTDs among implant users, plaintiffs' groups began to claim by the early 1990s that science was pursuing the wrong questions and therefore coming up with irrelevant answers. SGBIs, they contended, were not in the main associated with 'classic' CTDs, such as lupus and scleroderma, but with a more insidious and ill-defined set of 'atypical connective tissue disorders' (ACTDs). Included in this group were ailments that might reflect disorders of the immune system - chronic fatigue, headaches, hair loss, night sweats, swelling, joint pains - but that also occur with some frequency among women in ordinary life. Furthermore the cluster of conditions labelled ACTDs presents serious difficulties for 'objective' medical diagnosis, since the primary evidence of these symptoms' occurrence tends to be the reporting of them by victims. The imprecision of the conditions, together with their high background or 'normal' incidence, make ACTDs a particularly elusive target for epidemiological study.

Not surprisingly, important players in the SGBI cases have sought in various ways to establish - or disestablish - the claims of expert knowledge concerning ACTDs. Marcia Angell, the executive editor of *NEJM* and a vocal advocate of legal adherence to scientific standards, dismissed complaints of 'atypical' disease on the ground that they are impossible to pin down for purposes of scientific study:

> The problem of vague or shifting definitions of disease continues to plague the study of breast implants. When a study fails to find an increased risk of certain diseases or symptoms in women with implants, adherents of the theory that implants cause disease are quick to suggest that the diseases in question are different. It is impossible to study whether something causes illness, however, unless the illness is clearly described. Otherwise, it cannot be consistently diagnosed and its relation to breast implants cannot be examined. This sort of situation is what Karl Popper, the philosopher of science, had in mind when he said that a scientific hypothesis had to be 'falsifiable' to be meaningful.[39]

In terms of the expertise game, Angell's strategy is to deconstruct ACTD claims as both unscientific (not 'falsifiable') and subjective (not backed up by professionally accredited observation). 'Scientific', in her lexicon, is virtually synonymous with 'epidemiological', a position she articulated even more forcefully in an *amicus* brief, submitted jointly with *NEJM*, to the US Supreme Court in an unrelated case, *General Electric Co.* v. *Joiner*. The brief argued that general causation in toxic tort cases is a 'necessary proxy' for specific causation and can only be established through 'observational epidemiological research'.[40] This move sought to accomplish three important goals at once: to elevate the scientific and professional standing of epidemiology; to render irrelevant the evidence on specific causation, including the less institutionalized, 'new' research on biological markers and bioplausibility favoured by plaintiffs;[41] and to move into quadrant 4 of Figure 5.1 the results of self-reporting studies, such as a study of over 400 000 women health professionals (Women's Health Study) which did find evidence of increased risk of CTDs and which, not surprisingly, has been extensively cited by plaintiffs' experts.[42]

Angell's moves to deconstruct ACTDs and elevate the status 'observational epidemiology' make perfect sense when seen against the backdrop of wider struggles for authority in scientific medicine. The epidemiology that Angell defends, and for which *NEJM* serves as an authoritative mouthpiece, falls distinctly on the 'fastidious' side of the 'pragmatic–fastidious' boundary that the sociologist of science Stephen Epstein identified in his study of the politics of AIDS research.[43] 'Fastidious' science, as Epstein describes it, seeks clean study designs, with low ambiguity, in the hope of producing equally clean results; 'pragmatic' research, by contrast, is more willing to accommodate life's 'messy' realities in study designs, with consequently less clearly interpretable results. As Epstein notes, moreover, these stylistic preferences are not random within medicine but reflect deeper cleavages about the authority and status of 'pure' academic research as opposed to 'messy' clinical practice. The problem for claimants in toxic tort cases is that fastidious approaches are unlikely to detect many of the symptoms they complain of: increased incidence in

diseases of ordinary life or diffuse syndromes, often lacking 'objective' markers, and attributable to the synergistic interaction of multiple, poorly understood risk factors. Starkly put, the very atypicality of the SGBI plaintiffs' condition removes it from the investigative purview of 'normal' epidemiological science.

None of the participants in *Hall* explicitly challenged the concept of a single, universally applicable, gold standard for epidemiological research, although such an argument might well have benefited the plaintiffs. Instead the parties confronted the expert panel and the court with diametrically opposed visions of the nature, causes and scientific indicators of ACTDs. The defence argued, on the one hand, that claims concerning ACTDs were (as Angell also insisted) untested and untestable; on the other hand, they cited acknowledged authorities such as FDA's Kessler to support the position that there was no solid scientific evidence tying ACTDs to breast implants. The plaintiffs, by contrast, claimed that epidemiology was too blunt an instrument to establish a definitive relationship between silicone and ACTDs. They therefore presented collateral expertise with respect to biomarkers and other indicators of bioplausibility to shore up their causal argument (see below).

Judge Jones in the end affirmed the defendants' contention that ACTD was 'at best an untested hypothesis', overlooking in the process the more shaded assessment offered by his own epidemiology expert, Dr Merwyn Greenlick.[44] Judge Pointer, cutting a different path, instructed the MDL-926 expert panel to consider the relationship between breast implants and both classic and atypical manifestations of connective tissue disease or immune system disorders; his order listed some 40 separate conditions whose possible link to silicone exposure the panel was asked to review.

Standards of Admissibility

Players in the SGBI expertise game have diverged not only with respect to their framing of the central issues in the case but also in their representations of the standards governing admissibility. While ostensibly conforming to *Daubert*'s ruling precepts, plaintiffs and defendants in *Hall* offered the expert panel radically different readings of what the case means and how it bears on particular types of evidence. Generally the defendants sought to hold the plaintiffs' experts to the relatively restrictive moves along the *objectivity* axis, whereas the plaintiffs embraced the more enabling moves along the *experience* axis also sanctioned by *Daubert*.

The contrasts between the two strategies emerged clearly in the summation videotapes prepared by the two sides as part of their closing

argument. The defendants' presentation was shot through with references to both *Daubert* opinions, whose criteria were invoked, separately and together, as definitive tests of scientific reliability. Mary Wells, the chemistry expert, opened her argument with a brief 'sag demonstration' to make visible the issue of 'fit'. Allowing the gel to sag out of an upturned jar, Wells contended that none of the plaintiffs' evidence about silica was relevant because it did not concern the kind of substance actually used in implants. She quickly went on to list the *Daubert* criteria, including the 'prelitigation research' criterion announced by the Ninth Circuit in *Daubert II*. The plaintiffs' evidence on silicone chemistry, Wells argued, failed to meet any of the criteria and hence was inadmissible. The fact that witnesses for the plaintiffs, specifically Chris Batich and Leonico Garrido, possessed apparently solid professional credentials was simply irrelevant: 'The plaintiffs have not met their burden of proof to establish that the testimony of Dr. Batich or Dr. Garrido is scientific knowledge as required by *Daubert*. The fact that a scientist wants to speak does not mean that the words he speaks are supported by science.'[45] Similarly Jane Thorpe, the epidemiology expert, adopted language from *Daubert II* in asserting, 'Plaintiffs have failed to show in some objectively verifiable way that the experts have chosen a reliable scientific method and followed it faithfully. ... Atypical disease is a label for non-disease.'[46]

In his closing argument, Michael L. Williams, the chief trial attorney for the plaintiffs, tried for his part to avoid, through careful boundary work, the potentially trumping effect of the negative epidemiological studies relied on by defendants. He began by stressing the absence of research on the condition specifically complained of by the plaintiffs, that is, *atypical* CTDs. A review article by Kessler and other FDA scientists provided grist for his mill, especially the conclusion that 'research is also needed to further address the potential for a long-term association between silicone implants and rare or atypical connective tissue disease syndromes'.[47] Setting aside most of the available epidemiologic findings as irrelevant (because focused only on 'classic' CTDs), statistically weak or flawed, Williams created space for a wider range of expert testimony, including biomarker studies and studies of occupational exposure to silica. The existing epidemiology on ACTDs, his argument ran, provided enough indication of risk to take the plaintiffs' case across the threshold of admissibility, but it was not dispositive on its own. Under these circumstances, any reasonable medical scientist would look to additional sources of information - animal studies, biomarker studies, occupational studies, clinical experience - and this was precisely what he asked the court to do.

Significantly Williams neither mentioned *Daubert* by name nor invoked the criteria. This strategy comported well with the plaintiffs' overarching

goal of getting as many as possible experts, and their fields, accepted as both relevant and reliable. Williams wanted the court to take a holistic view of a large body of evidence, none of it compelling on its own, but all of it together conveying a telltale impression of smoke, with smouldering fires behind. Relying implicitly on *Daubert*'s injunction that admissibility decisions should be made on the basis of an expert's methodology, not the expert's conclusions, Williams showed from the record that panel members had found the plaintiffs' experts to be reputable scientists using ordinary methods.[48] Another argument used to justify the introduction of non-epidemiological evidence bordered on the equitable notion of estoppel. Williams asserted that pharmaceutical companies had not seen fit before 1991 to conduct clinical trials of silicone implants. They had based their claims about the safety of SGBIs on the very kinds of indirect evidence that they now sought to exclude from the courts. This was not fair. What had historically been the industry standard should now be the standard applied to the plaintiffs' evidence as well.

Williams hereby sought to make the industry's moral integrity and past behaviour part and parcel of the scientific admissibility determination. In less subtle ways, this was the same strategy that SGBI activist groups were following in fora other than the courts. A particularly splashy campaign was waged by the Command Trust Network (CTN), an information clearing house co-founded by former cancer patient Sybil N. Goldrich. CTN placed its advertisements in such highly visible locations as the Op-Ed page of the *New York Times*. All of them carried in bold letters the message, 'Dow Corning Knew', followed by varying graphic charges, such as 'silicone breast implants rupture', 'silicone breast implants leak' and 'silicone compounds kill roaches'. The moral message was not lost on juries. On 18 August 1997, for example, a Louisiana jury found that Dow Chemical had failed to test silicone properly for use in the human body and had misled a group of 1800 women about the health risks posed by the substance;[49] however, the dissolution of the Louisiana class action in December 1997 left the ultimate impact of this decision unclear.

Form and Function

It should be noted, finally, that the moves in the expertise game are shaped in substantial part by the processes used to elicit expert advice and testimony. A deposition, a pretrial hearing, a panel review or an actual trial each offers distinctive opportunities and constraints for the presentation of evidence. Differences in process between the expert panels in *Hall* and MDL-926, in particular, were significant enough to have a detectable impact on each one's

assessment of the available evidence. As noted earlier, the four *Hall* panellists were selected by a single technical assistant to Oregon's Judge Jones. More importantly, they were not court-appointed experts in the sense contemplated by Rule 706 of the Federal Rules of Evidence; instead Judge Jones elected to insulate them from testifying at trial and from possible cross-examination by designating them as technical advisers to the court. Once appointed, the panel operated like a kind of science court, asking questions of the parties' witnesses and watching videotaped summations of the evidence. Only after they had written their reports to the court were the advisers questioned by counsel for the parties. All of the resulting records informed Judge Jones's decision to exclude the plaintiffs' expert evidence.

Larger in scope and possible impact, the MDL-926 process resembled in some respects more a regulatory proceeding than a science court. Judge Pointer, as we have seen, screened the prospective panel members with a sharper sense of public accountability than his counterpart in Oregon. The expert panel was formally appointed pursuant to Rule 706; its members therefore may be called upon to testify at trial, supplementing the testimony of the party experts. There was from the beginning a strong sense that, if the MDL-926 process 'worked', it could serve as a model for other mass tort cases. Consequently a more self-reflective attitude prevailed than in the Oregon court; for instance, Judge Pointer collaborated with research staff at the Federal Judicial Center with an eye to creating an adequate documentary record of the proceedings. The multi-district expert panel met the parties' experts in July 1997 in a three-day hearing in Birmingham, Alabama. Borrowing directly from the regulatory model, the panel also held a shorter hearing with unaffiliated scientists in Washington, DC in November 1997. In keeping with its potential policy-steering role, the panel was asked to comment not only on the possible causal connection between SGBIs and auto-immune disease, but also on whether opinions contrary to its conclusions could be viewed as 'legitimate and responsible disagreement' within the profession.[50]

While it is still too early to evaluate the full impact of these procedural choices, it is safe to conclude that they did influence the parties' strategic options. Judge Pointer evidently took pains to emulate the non-adversarial format of many regulatory hearings.[51] His objective, presumably, was to promote a dispassionate but thorough airing of conflicting viewpoints, with as little lawyerly grandstanding as possible. The summation videos in *Hall*, by contrast, encouraged partisan representations and were designed, particularly on the defendants' side, to take advantage of the visual medium. Williams, presenting the plaintiffs' case, maintained a low-key, almost professorial demeanour, but (as described above) he used the opportunity to impugn the integrity of the industry position. The defence engaged in more

obvious stage management, from the choice of tough-talking, severely attired women to make the case for implant manufacturers, to a television clip of Commissioner Kessler denying, in a February 1996 interview on *Frontline*, that there was any evidence supporting the association between silicone and typical or atypical connective tissue diseases. The defendants' epidemiology presentation closed dramatically, with a damaging quotation from one of the plaintiffs' own experts, Dr Goldsmith, whose disembodied words commanded, for several seconds, both the viewer's attention and the video screen: 'At the moment, I must suggest to you that the evidence looks to me as if it's just that, that it's a possibility, and I would have to characterize it as less than 50 per cent. That would be where I am at the moment.'[52]

Conclusion

The SGBI example highlights a very general conclusion about the nature of expertise in the American legal system: what counts as legitimate expertise for purposes of the law is not determined by means of unambiguous rules applied impartially and without variance by solomonic judges. Expertise, rather, is the product of a dynamic process that actively engages a multiplicity of legal actors in constructing, validating and certifying particular knowledge claims as more authoritative than others. On the game board of expertise, players can marshall a complex array of resources – material, discursive, social and moral – in support of their moves to highlight some viewpoints as more knowledgeable than others. Credibility can be gained, most commonly, through moves that seek to professionalize and objectify the assertions of expert witnesses. Correspondingly doubt can be sown and trust undermined through moves that emphasize possible subjectivity and bias in the expert's position. The spaces in which the expertise game is played extend, moreover, well beyond the confines of particular lawsuits, into the more public worlds of television, books, newspapers, public lectures, the Internet, regulatory politics and even unrelated litigation.

Through a comparison of two expert advisory proceedings, in *Hall* v. *Baxter* and the federal multi-district litigation, we have seen further that *Daubert*, far from bringing uniformity to evidence law, has opened up wide new avenues for the exercise of judicial discretion. The gatekeeping power that judges enjoy in the post-*Daubert* era allows them considerable latitude to shape the moves made by other players in the expertise game and to decide, finally, whose moves to countenance as credible or authoritative. Subjective judicial preferences govern in important ways the process of

selecting experts, the framing of relevant evidentiary issues, the choice of applicable scientific standards and the procedural framework for soliciting expert evidence. While the parties and their experts also retain independent agency, their moves are controlled to varying degrees by the presiding judge's prior commitments concerning science and expertise. As a result, courts are no more likely to achieve impartiality in interpreting *Daubert* than they were in construing its forerunner, *Frye*. Indeed the SGBI case suggests that, instead of imbuing judges with a deeper appreciation of what makes science 'scientific', *Daubert* has merely provided a powerful new set of rhetorical resources for masking the unexamined assumptions of courts, litigants and even experts.

If expertise is contingently and strategically constructed within the confines of specific legal disputes and, worse yet, if it incorporates the biases and prejudices of presiding judges, where does this leave the legal system's search for reliable expert knowledge? Are all demarcation efforts doomed to failure, with *Daubert* representing only the latest misguided initiative to separate, once for all, scientific fact from fraud and fantasy? The model of the expertise game seems at first to offer only discouraging answers, for it stresses the malleability of expertise, the role of agency and artifice in representing expert knowledge and the inevitable tie-ins between cognitive and normative realities. There is, however, a more optimistic way to read *Daubert* in the light of the proposed model: not as a hopelessly idealized, and unworkable, formula for truth finding, but as an invitation to reflect on and make transparent the foundations of expert credibility. A lawsuit involving scientific evidence becomes, under this reading, an occasion for the 'fact finder' to choose between alternative frameworks of justification. To the extent that a relativizing model for looking at expertise lays bare the moves underlying expert claims and positions, it can only facilitate the task of comparison.

Justice, it is said, should not only be done but be seen to be done in liberal societies. Courts are important fora for the ritual and public affirmation of a polity's commitment to truth and moral order. Increasingly, as well, courts are being enrolled as agents of civic education in societies in which ordinary citizens live most of their lives comfortably detached from the complex machinery of scientific and technological production.[53] *Daubert* bestowed on judges the power to make some of this backstage apparatus more visible in the wake of technological failures, by requiring litigants to display to others the foundations of their supposed expert knowledge. Unavoidably, however, as the SGBI cases illustrate, judges themselves both set the scene and act upon the stages prepared for the litigants' expert contests. For courts to lose sight of their own role in the expertise game – to be seduced into mistaking the play for objective reality – remains the greatest threat to justice.

Notes

1 Michael Clark and Catherine Crawford (eds), *Legal Medicine in History* (Cambridge, 1994).
2 Andre A. Moenssens, James E. Starrs, Carol E. Henderson, and Fred E. Inbau, *Scientific Evidence in Civil and Criminal Cases* (4th edn, Westbury, NY, 1995).
3 *McLean* v. *Arkansas Board of Education* 529 F. Supp. 1255 (1982).
4 Martha C. Nussbaum, 'Platonic Love and Colorado Law: The Relevance of Ancient Greek Norms to Modern Sexual Controversies' (1994) 80 *Virginia Law Review* 1515–1651; Robert P. George, '"Shameless Acts" Revisited' 9 *Academic Questions*, (1995–6), 24–42.
5 See, in particular, Peter Huber, *Galileo's Revenge: Junk Science in the Courtroom* (New York, 1991); Kenneth Foster and Peter Huber, *Judging Science: Scientific Knowledge and the Federal Courts* (Cambridge, Mass., 1997).
6 Sheila Jasanoff, *Science at the Bar: Law, Science and Technology in America* (Cambridge, Mass., 1995).
7 For a compelling account of this process in the context of toxic torts litigation, see Jonathan Harr, *A Civil Action* (New York, 1995).
8 In 1977, a Texas jury awarded $170 000 to a plaintiff claiming injury from breast implants in what may have been the first such successful lawsuit in the country. See Joseph Nocera, 'Fatal Litigation' (1995) *Fortune*, 16 October, 13–15.
9 Thomas F. Gieryn, 'Boundaries of Science', in Sheila Jasanoff, Gerald E. Markle, James C. Petersen and Trevor Pinch (eds), *The Handbook of Science and Technology Studies* (Thousand Oaks, Cal., 1995), pp.393–456.
10 293 F. 1013 (D.C.Cir. 1923).
11 509 U.S. 579 (1993).
12 See, for example, Bruno Latour and Steve Woolgar, *Laboratory Life: The Construction of Scientific Facts* (Princeton, 1986).
13 939 F.2d 1106 (5th Cir. 1991).
14 Ibid., at 1113.
15 54 Cal.App.3d 100 (1975).
16 Ibid., at 107.
17 Ibid., at 111.
18 Charles Goodwin, 'Professional Vision' (1994) 96 *American Anthropology* 606–33.
19 See Jasanoff, *Science at the Bar*, pp.60–61.
20 Nussbaum, 'Platonic Love', 1607–22.
21 921 F.Supp. 666 (D.Nevada 1996).
22 Ibid., at 675.
23 43 F.3d 1311 (9th Cir. 1995), at 1317–18.
24 No. 1982 (Court of Common Pleas of Philadelphia County, Civil Trial Division), 1996.
25 *Blum*, at 70 (Appendix B).
26 Marcia Angell, *Science on Trial: The Clash of Medical Evidence and the Law in the Breast Implant Case* (New York, 1996). See also California Legislature, Senate Committee on Health and Human Services, *Hearing on the Safety of Silicone Breast Implants*, Sacramento, Cal., 5 February 1992.
27 *Hopkins* v. *Dow Corning Corp.* Case C88-4703-TEH (ND Cal. 1992). See also Angell, *Science on Trial*, p.55.
28 Council on Scientific Affairs, American Medical Association, 'Silicone Gel Breast Implants' (1993) 270 *JAMA*, 2602–6.
29 David A. Kessler, 'The Basis of the FDA's Decision on Breast Implants' (1992) 326 *New*

England Journal of Medicine, 1713–18.

30 Joseph Sanders and D.H. Kaye, 'Expert Advice on Silicone Implants: *Hall* v. *Baxter Healthcare Corp.*' (1997) 37 *Jurimetrics Journal* 113–28.

31 S. Gabriel *et al.*, 'Risk of Connective Tissue Diseases and Other Disorders after Breast Implantation' (1994) 330 *New England Journal of Medicine*, 1697–1702.

32 947 F.Supp. 1387 (D.Or. 1996).

33 See Sanders and Kaye, 'Expert Advice'.

34 *Andrews, et al.* v. *Bristol-Myers, et al.* U.S. District Court Case No. 94-258-JO, Status Conference Hearing Transcript, 4 April 1996, pp.41–2.

35 Sanders and Kaye, 'Expert Advice', The experts were Dr Merwyn R. Greenlick of Oregon Health Sciences University (epidemiology), Dr Robert F. Willkens of the University of Washington (rheumatology), Dr Ron McClard of Reed College (chemistry) and Dr Mary Stenzel-Poore of Oregon Health Sciences University (immunology).

36 The MDL-926 experts were Betty Diamond, an immunologist, Barbara Hulka, an epidemiologist, Peter Tugwell, a rheumatologist and epidemiologist, and Nancy Kerklivet, a toxicologist: 'Scientific Justice', *The Economist*, 26 July 1997, p.69.

37 For further discussion of this example, see Sheila Jasanoff, 'Judicial Construction of New Scientific Evidence', in Paul T. Durbin (ed), *Critical Perspectives on Nonacademic Science and Engineering* (Bethlehem, P.A. (ed.)), pp.220–24.

38 For a description of the chemical profile of SGBIs, see AMA Council on Scientific Affairs, 'Silicone Gel Breast Implants', p.2603; see also Angell, *Science on Trial*, p.106. On the theories of Nir Kossovsky concerning the molecular properties of silicone, see Gary Taubes, 'Silicone in the System' (December 1995) *Discover*, 65–75.

39 Angell, *Science on Trial*, p.104.

40 Brief of *Amici Curiae*, in the *New England Journal of Medicine*, and Marcia Angell, M.D., in Support of Neither Petitioners Nor Respondents, *General Electric Co.* v. *Joiner* No. 96-188, US Supreme Court, October 1996.

41 See, for example, Taubes, 'Silicone in the System'.

42 Charles H. Hennekens *et al.*, 'Self-reported Breast Implants and Connective Tissue Diseases in Female Health Professionals: A Retrospective Cohort Study' (1996) 275 *JAMA* 616.

43 Stephen Epstein, *Impure Science: AIDS, Activism and the Politics of Knowledge* (Berkeley, 1996), pp.255–6.

44 See Sanders and Kaye, 'Expert Advice', 120.

45 *In re Silicone Gel Breast Implant Litigation*, Defendants' Response Videotape, August 1996.

46 Ibid. Compare text of *Daubert II*, 43 F.3d at 1319.

47 Barbara G. Silverman *et al.*, 'Reported Complications of Silicone Gel Breast Implants: An Epidemiologic Review' (1996) 124 *Annals of Internal Medicine* 755.

48 Williams has made this point even more forcefully in unpublished writing since the decision in *Hall*: 'Two facts shock everyone not familiar with the record. First, plaintiffs' experts had world-class qualifications; they included the heads of the Departments of Rheumatology and Immunology at Oregon Health Sciences University and U.C. Davis Medical School, and dozens of other Ph.D.'s and board-certified M.D.'s. ... These highly respected medical school department heads are *not* junk scientists' (personal communication from Michael L. Williams, 13 August 1997).

49 *Spitzfaden* v. *Dow Corning Corp.* 92-2589 (Orleans Parish Civil District Court).

50 Sanders and Kaye, 'Expert Advice', 125.

51 Scientific Justice', p.69. Public hearings of this type permit a wide range of opinion to be expressed without premature polarization or hardening of views. For further

discussion of these points, see Sheila Jasanoff, *The Fifth Branch: Science Advisers as Policymakers* (Cambridge, Mass., 1990).

52 Testimony of Dr David Goldsmith, quoted on Defendants' Video Summation, August 1996.

53 Jasanoff, *Science at the Bar*, pp.215–17.

6 DNA Evidence in the Courtroom: A Social-Psychological Perspective

Jason Schklar

Introduction

DNA profiling and other kinds of scientific evidence are playing an increasingly important role in criminal investigations and court proceedings.[1] As the 'DNA wars' draw to a close and the admissibility of certain DNA profiling techniques becomes less controversial,[2] an important question still remains: are jurors able to understand the complex scientific and inherently probabilistic testimony that accompanies a DNA match report? Although some scholars opine that jurors are incapable of evaluating complex scientific evidence,[3] others argue that jurors perform this role adequately.[4] There is also concern that jurors will attribute an air of 'mystic infallibility' to scientific evidence[5] or a 'special aura of credibility' to a scientific witness,[6] or that jurors will be unduly influenced by overtly probabilistic evidence because it exudes an 'aura of precision'.[7] This latter sentiment resembles the court's remarks in *People* v. *Collins* that mathematics is 'a veritable sorcerer in our computerized society' who threatens to 'cast a spell' over triers of fact.[8]

In the opinion of a social psychologist, whether jurors can evaluate scientific evidence appropriately is an empirical question – one that Joseph Sanders correctly notes is only minimally informed by relevant data.[9] This belief is shared by the National Research Council, which recommended that 'behavioral research should be carried out to identify any conditions that might cause a trier of fact to misinterpret evidence on DNA profiling and to assess how well various ways of presenting expert testimony on DNA can reduce such misunderstandings'.[10] The purpose of this chapter is to review what limited behavioural research exists on the issue of juror reactions to