LAW, SCIENCE, AND SCIENCE STUDIES: CONTRASTING THE DEPOSITION OF A SCIENTIFIC EXPERT WITH ETHNOGRAPHIC STUDIES OF SCIENTIFIC PRACTICE*

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I. INTRODUCTION

> [These scientists] appear to have developed considerable skills in setting up devices which can pin down elusive figures, traces, or inscriptions in their craftwork, and in the art of persuasion. The latter skill enables them to convince others that what they do is important, that what they say is true . . . . They are so skillful, indeed, that they manage to convince others not that they are being convinced but that they are simply following a consistent line of interpretations of available evidence . . . . Not surprisingly, our anthropological observer experienced some dis-ease in handling such a tribe. Whereas other tribes believe in gods or complicated mythologies, the members of this tribe insist that their activity is in no way to be associated with beliefs, a culture, or a mythology.[1]

The appropriation, from anthropology, of ethnographic methodology by scholars in science studies—including Science and Technology Studies (STS), the Sociology of Scientific Knowledge (SSK), and cultural studies of scientific practices—is now commonplace. While the term "ethnography" has various meanings,[2] it usually refers to social science research that (i) explores "the nature of particular social phenomena, rather than setting out to test hypotheses about them," (ii) works with "unstructured" data, rather than data "coded at the point of data collection

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* This article is a modified version of a paper delivered (i) October 3, 2002, for the Schrader, Harrison, Segal & Lewis Lecture Series in Law and Psychology, Villanova University School of Law J.D./Ph.D. Program in Law and Psychology; and (ii) November 8, 2002, at the annual meeting of the Society for the Sociological Study of Science, Milwaukee, Wisconsin.

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[1] BRUNO LATOUR & STEVE WOOLGAR, LABORATORY LIFE: THE CONSTRUCTION OF SCIENTIFIC FACTS 69–70 (1986).

[2] Definition of the term *ethnography* has been subject to controversy: "Ethnographic methods, relying substantially or partly on 'participant observation,' have a long if somewhat checkered career in the social sciences. They have been employed, in various guises, by scholars identified with a variety of disciplines." Paul Atkinson & Martyn Hammersly, *Ethnography and Participant Observation*, *in* STRATEGIES OF QUALITATIVE INQUIRY 110, 110 (Norman K. Denzin & Yvonna S. Lincoln eds., 1998).

in terms of a closed set of analytic categories," and (iii) investigates "a small number of cases, perhaps just one, in detail."[3] In anthropology, the paradigm example of ethnography is the participant-observer of an exotic tribe or "traditional" culture, but the "application of ethnographic method by Western anthropologists and sociologists to the investigation of their own societies has been a central feature of twentieth-century social science."[4] In science studies, the "tribe of scientists" has become the object of laboratory studies, exemplified by Bruno Latour's two-year study at the Salk Institute of Biological Studies in La Jolla, California.[5] Just as the goal of traditional ethnography was to understand a foreign culture—by learning its language, developing key informants, etc.—the goal of ethnographic studies of scientific practices is to understand how science works.

Understanding science is also an ongoing project in the law, because "science has become, and will forever more be, a tool upon which the law must sometimes rely."[6] While judges and lawyers "are not known for their expertise in science,"[7] new standards of scientific validity in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*[8] and in the Federal Rules of Evidence[9] require that federal trial judges, and many state judges, act as gatekeepers, and that lawyers meet those standards when offering scientific expertise. Viewed optimistically, "there are signs that a 'third culture' is emerging in the law. This third culture would be one that integrates a sophisticated understanding of science into legal decisionmaking."[10]

Less encouraging are the results of a recent study of how well judges understand science and scientific method. "[T]he survey found that judges lacked the general scientific literacy required for the full application of the *Daubert* guidelines . . . . Indeed, many judges did not recognize their lack of understanding . . . ."[11]

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[3] *See id.* at 110–11. Ethnographic analysis usually involves "explicit interpretation of the meanings and functions of human actions, the product of which mainly takes the form of verbal descriptions and explanations, with quantification and statistical analysis playing a subordinate role at most." *Id.* at 111.

[4] *Id.* at 113.

[5] *See generally* LATOUR & WOOLGAR, *supra* note 1.

[6] DAVID L. FAIGMAN, DAVID H. KAYE, MICHAEL J. SAKS, & JOSEPH SANDERS, SCIENCE IN THE LAW: SOCIAL AND BEHAVIORAL SCIENCE ISSUES, at vii (2002).

[7] *Id.* at v.

[8] *See* Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579, 593–94 (1993) (science defined as involving testability, low error rate, peer-reviewed publication, and general acceptance in the scientific community).

[9] *See* Fed. R. Evid. 702 (scientific testimony should be based on sufficient data, reliable methodology, and reliable application of the methodology to the facts of the case).

[10] FAIGMAN ET AL., *supra* note 6, at v (citing JOHN BROCKMAN, THE THIRD CULTURE (1995) (emergence of "third culture" through increasing number of scientists writing for a general audience)).

[11] Shirley Dobbin, Sophia Gatowski, James Richardson, Gerald Ginsburg, Mara Merlino, & Veronica Dahir, *Applying Daubert: How Well Do Judges Understand Science and the Scientific Method?*, JUDICATURE, Mar/Apr 2002, at 247 (summarizing the results of these authors' research as reported in *Asking the Gatekeepers: A National Survey of Judges on Judging Expert Evidence in a Post-Daubert World,* 25 LAW & HUM. BEH. 433, 433–58 (2001)).

In any event, the need for judges and lawyers to understand science is clear, which suggests that an interdisciplinary engagement with the field of science studies would be beneficial in law. Dissimilarities, however, between science studies and the project of developing sophisticated law-science relations are immediately apparent.

Law-science relations are characterized by a certain idealization of, and dependence upon, science as a determinative source of stable knowledge for law.[12] This is neither to say that all "science" and all scientific "experts" are revered—for example, there is "junk science," and experts can be discredited—nor that science deals in timeless certainties. But, as to valid science and credible experts, law is not critical of science or its pretensions. In other words, law has adopted science's self-image, such that legal *accounts* of the scientific enterprise generally mirror the internal accounts of scientists themselves.[13] In science studies, however, the very product of the "discipline" has been an alternate account of the scientific enterprise that challenges both internal accounts and popular idealizations. For example, while an internal scientific or idealized account of the success of a new scientific theory may refer to a hypothesis that was confirmed by data collection, an alternative account may explain the success in terms of social circumstances, institutional authority, and rhetorical networks.[14] This can be, and has been, viewed as a critique of science itself,[15] though most proponents of such alternative accounts view their work as primarily descriptive *and* as critical only of idealized "accounting practices."[16] Far from trying to disprove the scientific theory under study, the contemporary science studies "accountant" usually engages in an "epistemologically symmetrical" analysis of scientific controversies. Rather than revealing the

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[12] *See* David S. Caudill, *Ethnography and the Idealized Accounts of Science in Law*, 39 SAN DIEGO L. REV. 269, 272–80 (2002).

[13] *See, e.g.,* Michael Mulkay, Jonathan Potter, & Steven Yearley, *Why an Analysis of Scientific Discourse is Needed*, *in* SCIENCE OBSERVED: PERSPECTIVES ON THE SOCIAL STUDY OF SCIENCE 171 (Karin D. Knorr-Cetina & Michael Mulkay eds., 1983).

> [In formal literature, scientists] rely almost exclusively on what has been called an empiricist repertoire. Stylistically, this means that scientists write in a conventionally impersonal manner. By reducing explicit references to human agency to a minimum, authors construct texts in which the physical world often seems literally to speak and act for itself. When the author is allowed to appear in the text, he is presented either as being forced . . . to reach theoretical conclusions . . . by the unequivocal demands of the natural phenomena which he is studying or as being rigidly constrained by rules of experimental procedure.

Id. at 197. Criteria such as testability are often "presented as constituting a clear-cut, impersonal, unavoidable constraint on the choice of correct theories." *Id.* at 198. In such accounts, scientific theorizing, experiments, and corresponding publications and criticism in learned journals are constitutive—"essentially cognitive elements which have traditionally been supposed to be solely responsible for the constitution of scientific knowledge." *Id.* at 183. *Compare with Daubert*, 509 U.S. at 593–94 (valid science usually involves testability, low error rate, peer-reviewed publications, and general acceptance).

[14] *See generally* LATOUR & WOOLGAR, *supra* note 1.

[15] *See generally* PAUL GROSS & NORMAN LEVITT, HIGHER SUPERSTITIONS: THE ACADEMIC LEFT AND ITS QUARRELS WITH SCIENCE (1994).

[16] *See* Mulkay et al., *supra* note 13, at 198–99 (criticizing the "regular pattern of accounting" in internal scientific accounts, and recommending discourse analysis which would be "rather like a natural history of social accounting").

errors or unscientific knowledge of one side, both "sides" are described in terms of, for example, social circumstances, institutional authority, and rhetorical networks.[17]

These brief, introductory remarks highlight the differences between science studies and law-science relations that make interdisciplinary engagement problematic. In a trial, if litigating parties offer opposing scientific "knowledge," theories, or explanations, one may be deemed invalid and inadmissible; if both are admissible, the judge or jury can select the best. At that point, even if there was time for a careful analysis of the social, institutional, and rhetorical aspects of each "side," no one is interested in epistemological symmetry! Of course, each side's lawyer during cross-examination may want to suggest either that the other side's experts are biased due to economic interests, that their testimony is based only on institutional authority and not on scientific methodology, or that their persuasiveness is "mere rhetoric." But, the unwelcome insight for lawyers from science studies is that *all* science is inevitably interested, authoritative, and rhetorical, even their own.

Notwithstanding the foregoing barriers to interdisciplinary engagement, I believe that ethnographic studies of scientific practices are analogous in many ways to pre-trial depositions of experts. The purpose of this article is to explore that analogy. Section II offers a more detailed description of ethnography in science studies. Section III discusses parallels between ethnography and deposition techniques and strategies. Section IV concludes that notwithstanding the differences between the jurisprudence of law-science relations and the goals of science studies, lawyers deposing certain scientific experts should engage in a form of ethnographic methodology in preparation for trial.

II. ETHNOGRAPHY AND SCIENCE STUDIES

> We are not arguing that somatostatin does not exist, nor that it does not work, but that it cannot jump out of the very network of social practice which makes possible its existence.[18]

Because contemporary science studies is commonly associated with naive social constructivism, those who study the social, institutional, and rhetorical aspects of science often go to great pains to explain what they are *not* saying. For example, Alan Gross—famous for his claim that "scientific knowledge is not special, but social; the result not of revelation, but of persuasion"[19]—ends his compelling study of the inevitable, constitutive role of rhetoric in science with an epilogue on the realism debate:

> Those who resist the notion that science is fundamentally rhetorical point to the "brute facts": planes fly, men cannot have babies . . . . But a rhetoric

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[17] *See* Pam Scott, Evelleen Richards, & Brian Martin, *Captives of Controversy: The Myth of the Neutral Social Researcher in Contemporary Scientific Controversies*, 15 SCI., TECH., & HUM. VALUES 474, 474–75 (1990).

[18] LATOUR & WOOLGAR, *supra* note 1, at 183.

[19] ALAN G.. GROSS, THE RHETORIC OF SCIENCE 20 (1990).

> of science denies none of these . . . . The claim of rhetoric is that the phrase "brute facts" is on oxymoron. Facts are by nature linguistic—no language, no facts.[20]

Gross's anti-realism, i.e., "the sciences create bodies of knowledge so persuasive as to seem unrhetorical[,] . . . the way the world is,"[21] may be contestable, but at least he rescues himself from his purported denial that planes fly. While Gross nevertheless insists that realism "must remain . . . a rhetorical construct,"[22] others accused of ignoring "reality" in favor of social constructivism are more careful to avoid over-reacting to realism. Barry Barnes, associated with the "strong programme" social constructivism that has been accused of replacing *nature* with *society,* or with social "interests," as the determinant of scientific knowledge,[23] rejects the view "that reality has nothing to do with what we say of it."[24] "Nor does it follow," from the view that reality will tolerate alternative descriptions, "that because language is not constrained and fixed by what it is used to refer to, it has no referential aspect at all. Uncritical acceptance of assumptions of this kind represents an over-reaction to realism."[25]

Barnes is rightly concerned that when sociologists of knowledge claim "that [scientists] treat their own knowledge as valid only in certain circumstances or under certain conditions," this is often misread as a claim "that [scientists'] knowledge is not valid"—a common misconception. Such concerns evidence what has been called the "naturalist turn" in science studies.[26] This turn is exemplified in Bruno Latour's defensive remark:

> [The] ozone hole is too social and too narrated to be truly natural; the strategy of industrial firms and heads of state is too full of chemical reactions to be reduced to power and interest; the discourse of the ecosphere is too real and too social to boil down to meaning effect. Is it our fault if the networks are simultaneously real, like nature, narrated, like discourse, and collective, like society?[27]

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[20] *Id.* at 202–03.

[21] *Id.* at 206–07.

[22] *Id.* at 207.

[23] *See, e.g.*, Hans-Jörg Rheinberger, *Experimental Systems, Graphematic Spaces*, *in* INSCRIBING SCIENCE: SCIENTIFIC TEXTS AND THE MATERIALITY OF COMMUNICATIONS 286 (Timothy Lenoir ed., 1998) ("If, in the perspective of social construction, we have lost the illusion of an ultimate reference called 'nature,' what do we gain by trying to compensate for this loss with the mirror image of 'society' as a new and insurmountable reference?").

[24] *See* Barry Barnes, *How Not to Do the Sociology of Knowledge*, *in* RETHINKING OBJECTIVITY, 21, 31–32 (Allan Megill ed. 1994).

[25] *See id.*

[26] *See generally* WERNER CALLEBAUT, TAKING THE NATURALIST TURN OR HOW REAL PHILOSOPHY OF SCIENCE IS DONE (1993); *see also* David S. Caudill, *Law and Science: An Essay on Links and Socio-Natural Hybrids,* 51 SYRACUSE L. REV. 841, 853–61 (2001) (discussing various accommodations of "reality" or "nature" in recent science studies, such as constrained constructivism and agential realism).

[27] BRUNO LATOUR, WE HAVE NEVER BEEN MODERN 6 (Catharine Porter trans., 1993) (emphasis omitted).

The potential of science studies to contribute to understanding the scientific enterprise, in policy debates and even in the field of law-science relations, depends in part on avoiding the popular misunderstanding that science studies is in denial concerning the utility of scientific knowledge. Indeed, in the second edition of *Laboratory Life* (1986), Latour and Woolgar omitted the word "social" from their subtitle, "The [Social] Construction of Scientific Facts," in recognition that the term no longer has meaning.[28]

> "Social" retained meaning [in early sociology of science] to define a realm of study which excluded considerations of "scientific" context. It also had meaning in [strong social constructivism] to explain the technical content of science (by contrast with internalist explanations of technical content). In all such uses, "social" was primarily a term of antagonism, one part of a binary opposition.[29]

We might say that science studies have become a friendly interdiscipline, interested more in adding to our understanding of science than in claiming science bears no relation to reality.

What do studies of the social, institutional, and rhetorical aspects of science add to our practical understanding of science? From one perspective, the careful study of what scientists do, how they speak and write, is trivial. Of course science is uncertain, changes over time, is dependent on measurement devices, requires funding, involves human beings and social institutions, relies on language and persuasion, and so forth. Latour and Woolgar note that the reaction of the Salk Institute scientists they studied was that "it was all rather unsurprising": "How could anyone *ignore* the details of our daily work?"[30] As to rhetoric, John Nelson remarks that while it is easy to show that all disciplines are rhetorical, because they are "personal, institutional, and therefore political," some "dismiss this as a truism that could never carry significant implications . . . . It is, they maintain, like learning that you have always spoken prose: true but with no practical consequences."[31]

On the other hand, it is precisely the rhetoric of science that trivializes its social and institutional aspects, and denies its rhetorical and narrative features.[32] Scholars who study the rhetoric of science have criticized the notion "that scientific discourse is . . . devoid of the rhetorical and metaphorical maneuvers that are common in [other disciplines]."[33] Indeed, there is no escape from "informal argumentation, . . . figures and tropes, . . . the selective naming and framing of issues, . . . appeals to communally-

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[28] *See* LATOUR & WOOLGAR, *supra* note 1.

[29] *See id.* at 281 (postscript to second edition).

[30] *See id.* at 274.

[31] JOHN S. NELSON, TROPES OF POLITICS: SCIENCE, THEORY, RHETORIC, ACTION 47 (1998).

[32] *See* GROSS, *supra* note 9, at 32 ("for scientists, the results of science depend not on argument but on nature herself").

[33] Richard D. Johnson-Sheehan, *Metaphor in the Rhetoric of Scientific Discourse*, *in* ESSAYS IN THE STUDY OF SCIENTIFIC DISCOURSE: METHODS, PRACTICE, AND PEDAGOGY 167 (John Battalio ed., 1998) [hereinafter ESSAYS IN THE STUDY OF SCIENTIFIC DISCOURSE].

held values, or from the need to adapt arguments to ends, audiences, and circumstances."[34]

Not only is scientific discourse rhetorical, it is rhetorical "in a constitutive rather than ornamental fashion."[35] "[S]tyle is epistemic," because "rhetorical figures . . . *enable* scientists to develop and extend their knowledge about scientific concepts."[36] And still, the rhetoric of science is hidden in a discourse that typically denies its rhetoricity.

In contrast to the "essentially cognitive elements which have traditionally been supposed to be solely responsible for the constitution of scientific knowledge,"[37] social and institutional aspects of science alike are rendered invisible as contingencies.

> The result of the construction of a fact is that it appears unconstructed by anyone; the result of rhetorical persuasion . . . is that participants are convinced that they have not been convinced; . . . the result of the investments of credibility, is that participants can claim that economics and belief are in no way related to the solidity of science; as to the circumstances, they simply vanish from accounts . . . .[38]

This situation lends to the conviction in science studies that sociologists or discourse analysts cannot simply look to internalist, or "official," accounts, including the formal text of a published scientific paper, "as a reliable guide to the actions involved in producing it and to other actions on which it reports."[39] Scientists' own accounts of their actions, through theorizing and experiments, "will always look as though they were legitimately constitutive of scientific knowledge," precisely because references to personal or social contingencies are systematically eliminated in the course of formal discourse.[40] However, in scientists' informal discussions, gossip, and humor, the "part played by social and personal contingencies in scientific action and belief" is often more obvious.[41] This is not to say that scientists acknowledge or grant constitutive relevancy to social and institutional determinants, but only that, perhaps indirectly, *references* to "contingent" matters will appear more clearly in informal discourse. That is why the ethnographic interview and the practice of "following scientists around" have become methodologies in science studies.

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[34] Herbert W. Simons, *The Rhetoric of the Scientific Research Report: 'Drug-pushing' in a Medical Journal Article*, *in* THE RECOVERY OF RHETORIC: PERSUASIVE DISCOURSE AND DISCIPLINARITY IN THE HUMAN SCIENCES 148, 150 (R.H. Roberts & J.J.M. Good eds., 1993).

[35] Gay M. Gragson & Ted L. Gragson, *Uncertain Science and the Sponsored-Research Process*, *in* ESSAYS IN THE STUDY OF SCIENTIFIC DISCOURSE, *supra* note 33, at 3, 19 ("Scientific claims are accepted only if they persuade the community within which they are put forward . . . .").

[36] Heather Brodie Graves, *Marbles, Dimples, Rubber Sheets, and Quantum Wells: The Role of Analogy in the Rhetoric of Science*, 28 RHETORIC SOCIETY Q. 25, 26, 45 (1998).

[37] Mulkay et al., *supra* note 13, at 183.

[38] *See* LATOUR & WOOLGAR, *supra* note 1, at 240.

[39] Mulkay et al., *supra* note 13, at 178.

[40] *See id.* at 191, 193.

[41] *Id.* at 197.

Like the anthropologist who views culture as a "silent language" of unconscious traditions and conventions,[42] there is an effort in science studies to "provide insights into those aspects of [scientific] culture taken for granted by its members."[43] Just as the traditional western ethnographer lived with and observed an alien culture,[44] the ethnographic approach in science studies adopts the perspective of the stranger to maintain analytic distance from the conventional "explanations of activities prevalent within the culture being observed."[45] And just as the anthropological ethnographer ideally "moves . . . from data to idea"—remaining open to the "unanticipated realities of fieldwork," and to the possibility that a pre-planned inquiry "is misleading and irrelevant"[46]—the science studies ethnographer "*does not know* the nature of the society under study, nor where to draw the boundaries between the realms of technical, social, scientific, natural, and so on."[47]

The position of the ethnographer of science invites a comparison in law-science relations, *not* to the evaluations of scientific validity by judges and juries and *not even* to the lawyer-as-advocate arguing in favor of one scientific theory while attempting to discredit another, *but* to the pre-trial deposition of a scientific expert.

III. THE ETHNOGRAPHIC DEPOSITION

> [T]he questioner's goal is to get the [expert] to talk freely, with a minimum of interruption and interjection by the questioner. Unlike the approach used on cross-examination at trial[,] the aim of the deposition is to get the expert to talk openly and give complete explanations without holding anything back.[48]

Commentators' guidance concerning how to take an expert's deposition varies, often for strategic reasons. Some, for example, recommend that attorneys begin by asking the expert for her opinions—"[a]sk the most important question first"[49]—while others suggest exploring the expert's

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[42] JAMES L. PEACOCK, THE ANTHROPOLOGICAL LENS: HARSH LIGHT, SOFT FOCUS 4 (1986). *See also* RICHARD A. BARRETT, CULTURE AND CONDUCT: AN EXCURSION IN ANTHROPOLOGY 54–55 (1984).

[43] *See* LATOUR & WOOLGAR, *supra* note 1, at 278.

[44] *See* PEACOCK, *supra* note 42, at 18–19 (Ethnography, "the most distinctive kind of anthropological research," means "a description of a certain way of life," based on fieldwork—"living with and observing a living group").

[45] *See* LATOUR & WOOLGAR, *supra* note 1, at 278. "It is not necessary to travel to foreign countries to obtain this effect, even though this is the only way that many anthropologists have been able to achieve 'distance.'" *Id*. at 279.

[46] PEACOCK, *supra* note 42, at 69. ("In short, research in fieldwork often begins with encounter, then proceeds to interpretation.").

[47] *See* LATOUR & WOOLGAR, *supra* note 1, at 279.

[48] Raoul Kennedy, *Expert-Witness Depositions*, *in* EFFECTIVE DEPOSITIONS 389, 429 (Henry L. Hecht ed., 1997).

[49] *E.g.,* DAVID M. MALONE & PAUL J. ZWIER, EFFECTIVE EXPERT TESTIMONY 68 (2000) ("Her opinions are not what she wants to talk about immediately. So ask for her opinions first.").

qualifications and experience—"by asking for the expert's ultimate opinion [lawyers may] become so confused that they fail to inquire systematically into the factual or other evidentiary bases . . . ."[50] Nevertheless, the advice available regarding depositions, in treatises and continuing education materials, is strikingly uniform and in many respects amounts to a recommendation that attorneys behave like ethnographers.

For example, attorneys are advised to "adopt the persona of the ignorant (but interested) student," even though "that ignorance is largely feigned," if the lawyer "can identify occasions when the expert has substituted judgment for knowledge, assumptions for facts, faith for understanding, or opinion for truth."[51] Less cynically, anthropologists also place the ethnographer "in the position of the learner, the student of what is to be taught by the culture,"[52] even though the ethnographer is not really "a passive, amorphous sponge, soaking up the particularities of the exotic experience":[53] "[T]he ethnographer . . . is actively engaged in constructing his data . . . . [E]thnographic analysis . . . is quite structured and precise . . . . Encounter . . . leads to deeper understanding, provided we sort out the patterns and principles behind the meaning [of ceremonies and rituals, myths and legends]."[54]

For the ethnographic observer in a laboratory, the notion of exoticism is replaced by "the working principle of *uncertainty*":[55] "By this we mean that we regard it as instructive to apprehend as strange those aspects of scientific activity which are readily taken for granted . . . . Paradoxically, our utilisation of the notion of anthropological strangeness is intended to dissolve rather than reaffirm the exoticism with which science is sometimes associated."[56]

Like the attorney who, in deposing an expert, merely assumes the role of an ignorant student, the anthropologist does not really "go native" and

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> The background questioning at the beginning of the typical lay-witness deposition is often counterproductive in an expert deposition. It allows the expert to warm-up to his topic, to take your measure, and to postpone answering the hard questions until he has become acclimated to the deposition process. The alternative is to get right into the substance of the deposition.

See DAVID M. MALONE & PETER T. HOFFMAN, THE EFFECTIVE DEPOSITIONS: TECHNIQUES AND STRATEGIES THAT WORK 264 (2d ed. 2001).

[50] Raoul Kennedy, *supra* note 48, at 429 ("The beginning point of the deposition should be the nature of the expert's formal education, other training and experience, awards, employment history, and experience as a trial consultant and witness."). Kennedy acknowledges that if an expert will not appear at trial, an attorney may chose tactically to ignore an expert's qualifications "in hope that opposing counsel will neglect to qualify the expert," but he recommends generally that qualifications should be explained first. *See id.* at 431.

[51] *See* MALONE & ZWIER, *supra* note 49, at 48.

[52] PEACOCK, *supra* note 42, at 63 (contrasting psychoanalytic desire to cure or change a patient with ethnographer's desire to seek the informant's knowledge).

[53] *Id*. at 70.

[54] *Id.* at 70–71.

[55] LATOUR & WOOLGAR, *supra* note 1, at 279.

[56] *Id.* at 29.s

"bow before the knowledge of a primitive sorcerer."[57] Similarly, the ethnographer of science actually treats "the accounts given them by [scientists] with considerable caution."[58] For both the lawyer (in deposing an expert) and the ethnographer (of scientific practices), teacher-student rapport must be established in the absence of both (i) a genuine aspiration "to join the ranks of professional scientists," and (ii) actual socialization.[59]

Ethnography, again, is generally associated with the collection of unstructured data that is not "coded at the point of data collection in terms of a closed set of analytic categories."[60] Lawyers taking depositions are also reminded to avoid, "to the extent possible, . . . carefully prepared questions."[61] Preparation for the deposition should allow for flexibility, not only because informal dialogue is easier[62] and open questions "encourage the building of a rapport,"[63] but also because attorneys should not presume that they know what an expert will say.[64] Even if an expert's report is in hand, "it is dangerous to rely on the opposing counsel and his expert to present the lawyer with an adequate and informative statement of her opinions . . . ."[65] "[T]o the extent that," in a deposition, "you are only reviewing things already known, confirming preconceptions, or displaying your own knowledge of the facts, you are not discovering new information and you may be wasting valuable opportunities to gain knowledge. . . ."[66]

Experts should be encouraged "to talk—to lecture, to reminisce, to discuss, to evaluate— . . . without the constant intrusion of narrow questions that invite narrow answers."[67] These recommendations parallel ethnographic methodology in two significant respects. First, the effort in science studies to avoid reliance on formal scientific discourse leads to heavy reliance on informal discourse (interviews with informants as well as on-site observation of discussions among participants, gossip, and jokes). The purpose of this reliance is to "generate analyses in which the construction of scientific knowledge can be more easily depicted as a

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[57] *See id.*

[58] *Id.* at 26.

[59] *See id.* at 19, 29.

[60] *See* Atkinson & Hammersly, *supra* note 2, at 110.

[61] *See* STUART A. SUMMIT, PRACTICING LAW INSTITUTE, DISCOVERY TECHNIQUES 74 (1974) [hereinafter SUMMIT]; *see also* MALONE & HOFFMAN, *supra* note 49, at 85 ("[I]f you have an extensive outline or lengthy checklist of questions, . . . you must be careful not to allow those outlines . . . to interfere with your concentration on the witness.").

[62] *See* SUMMIT *supra* note 61, at 73–74.

[63] MALONE & ZWIER, *supra* note 49, at 52. *See also id.* at 53 ("open style of questioning encourages the witness to satisfy their desire to be understood and believed"); *id.* at 52 ("open questions are [the attorney's] sharpest tool"); *id.* at 67 (move "from wide-open questions seeking new information to confirmation of known information").

[64] *See id.* at 55 ("The single best piece of advice on deposing the opposing expert is 'Do not assume you know any answers the expert will give.'").

[65] *Id.* at 69. *See also* FED. R. CIV. P. 26(a)(2) (with a few exceptions, expert reports must be provided).

[66] MALONE & HOFFMAN, *supra* note 49, at 51.

[67] *Id.* at 77. *See also* Kennedy, *supra* note 48, at 438 ("[Y]ou should strive to give the expert an unfettered opportunity to explain everything on which the opinion or conclusion is based.").

contingent social process."[68] Second, ethnographers of science ideally make no attempt "to delimit the area of competence prior to [analysis]," and therefore avoid any "prior hypothesis about a concept (or set of concepts) which might best explain what [is] to be encountered in the field."[69] In these respects, the efforts of attorneys deposing their opponents' expert witnesses seem to mirror the efforts of ethnographers to understand a particular scientific activity.

Interestingly, while some commentators advise attorneys to depose an expert in a "room . . . over which you have control," so that the witness can be directly across from you "and his lawyer will not be in the witness' line of vision,"[70] others recommend that the deposition should be held in the expert's office.

> [T]he attorney will have the opportunity to learn more about the expert, her approach on matters, and her other interests. The titles of books on the expert's shelves, the identity of her colleagues down the hall, the photographs of handshaking politicians on the wall—all of these give some additional clues to the personality and allegiances of the witness.[71]

Such advice parallels the significance attached in science studies to monitoring "the daily activities of scientists in their natural habitat," such as a laboratory with its machines, inscription devices, conversations, skills, routines, and so forth.[72]

Even as the expert deposition proceeds from an initial open-ended inquiry, during which the attorney is simply trying to understand a scientists' opinion and its basis, to what we might call the development of a critical perspective on the opinion, the parallels with ethnographic methodology remain. For example, even as attorneys are taught that the *goal* of the expert deposition is to learn what the opposing expert thinks and "not to impeach or impugn the expert,"[73] it is clear that planning for the later attack on an expert's opinion begins during the deposition. For example, questions about education and employment background may suggest than an expert is not qualified, or that one needs to hire "different or more experts . . . to compete favorably with the opposition's expert."[74] Furthermore, prior experience as an expert may suggest bias, willingness to testify full-time or in too many fields, or even, in contrast to such pejorative implications, excellence as a witness.[75] Questions about assumptions the expert made in forming an opinion can establish "that other choices are reasonable" and that by "using those other possibilities, different results

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[68] Mulkay et al., *supra* note 13, at 198. "[S]cientists themselves systematically eliminate references to contingent action as positive grounds for the validation of knowledge claims in the formal literature . . . ." *Id.* at 195.

[69] LATOUR & WOOLGAR, *supra* note 1, at 29.

[70] SUMMIT, *supra* note 61, at 76.

[71] MALONE & ZWIER, *supra* note 49, at 46.

[72] LATOUR & WOOLGAR, *supra* note 1, at 274.

[73] *See* Kennedy, *supra* note 48, at 428.

[74] *See id.* at 430.

[75] *See id.* at 432–33.

will follow."[76] Identifying scientific literature with which the expert disagrees, or other work that could have been undertaken to support an opinion, is likewise preparatory for cross-examination at trial.[77]

The specific orientation of an attorney as an advocate, even during a deposition that is primarily educational as opposed to adversarial, suggests a significant contrast to ethnographic methodology in science studies. The sociologist or "anthropologist" of science, after all, is not trying to show that because a particular scientific activity is a social, institutional, and rhetorical enterprise, it is bad science. The goal rather is to "examine how objects of knowledge are constituted in science," including the "processes of interaction between scientists and others within which and through which scientific beliefs take shape."[78] This philosophy of neutrality—all science is inevitably social, institutional, and rhetorical—contrasts sharply with the view that such "factors" signal error or deficiencies.[79] That latter view, associated with early sociology of science,[80] would likely be shared with litigators who identify (during cross-examination of experts) financial, occupational, methodological, or political interests as potential biases that interfere with "good science."[81] In short, the deposing attorney and the ethnographer of science seem to have completely different agendas—the attorney is focused on discrediting the opposing expert as unqualified, biased, and unscientific (*and* on demonstrating that his or her expert is qualified, unbiased, and scientific), while the ethnographer advocates only for the value of his or her study in understanding the complexity of scientific practice.

If, however, ethnographic methodology is viewed as a *critical* enterprise, i.e., a critique of idealized conceptions of science as fundamentally methodological, cognitive, and natural, then the contrast with the expert deposition is not so clear. That is, setting aside the attorney's collaboration (at trial) with a legal system wherein science is idealized, the attorney conducting a deposition of an opposing expert will treat the expert's testimony as an idealized, internalist account of a scientific practice, complete with theory (hypothesis), data, experiment (testability), methodology (low error-rate), supporting peer-reviewed publications, and general acceptance (consensus).

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[76] *See* MALONE & HOFFMAN, *supra* note 49, at 267.

[77] *See id.* at 273–79.

[78] *See* Karin D. Knorr-Cetina, *The Ethnographic Study of Scientific Work: Toward a Constructivist Interpretation of Science*, *in* SCIENCE OBSERVED: PERSPECTIVES ON THE SOCIAL STUDY OF SCIENCE 115, 117 (Karin D. Knorr-Cetina & Michael Mulkay eds., 1983).

[79] See LATOUR & WOOLGAR, *supra* note 1, at 23 ("emphasis on 'social' in contradistinction to 'technical' can lead to the disproportionate selection of events for analysis which appear to exemplify 'mistaken' or 'wrong' science").

[80] *See* JONATHAN POTTER, REPRESENTING REALITY: DISCOURSE, RHETORIC, AND SOCIAL CONSTRUCTION 17–18 (1996).

[81] Notably, the neutrality of contemporary ethnographers of science also contrasts with strong social constructivism—the search for social interests rather than "natural" phenomena "to establish the potentially social causes of particular scientists' belief-preferences"—because the nature-society boundary breaks down after the naturalist turn in science studies. *See* Knorr-Cetina, *supra* note 78, at 117.

As an advocate, the attorney will be suspicious, but the next move is crucial. The attorney can stay within the idealized frame of reference, like the science studies scholar who relies upon formal, internal accounts *and* fails to notice their rhetorical features. Even if the expert rambles on about her background and interests, the attorney will only hear (or read, in a transcript) about reliable and acceptable data, methodology, experiments, and conclusions. If, on the other hand, the attorney forgets for a moment (until trial) the pretensions of science and assumes the role of an ethnographer, then the attorney can begin listening (or reading) for the allegedly contingent but potentially constitutive, purportedly non-scientific but ever-present, ways that science is constructed.

As to rhetorical strategies, lawyers are especially attuned to persuasive techniques; however, by using words like "*indicate, suggest,* and *show,*" rather than "*think, believe,* and *suspect*," science appears to lack rhetoric, even though such word choices are rhetorical moves.[82] If lawyers, like ethnographers of science, suspected persuasion, they would find more of it. Similarly, if lawyers entertained the possibility that science involves, alongside *theory/data/methodology/publication*, a network of language, values, standards, institutional gate keeping, experimental conventions, financial interests, theoretical paradigms, models and metaphors, evolving and constraining measurement technologies, as well as personalities with particular and contingent ways of thinking, acting, arguing, and negotiating consensus, they would find some examples. As a thought experiment, imagine that everything the scientist says is contingent is actually constitutive, and everything said to be constitutive is contingent, and try to confirm a few instances.

If an attorney were successful, in a particular case with a particular expert, in identifying the constructive activities of scientists, how would that "insight" be translated into the courtroom? The risk is that science itself would be devalued, a high price to pay when your own client has hired scientific experts. The constructive activities of science, therefore, would seem to need to be translated back into errors, mistakes, failures, and unjustified beliefs on the part of the opposing expert.

The inevitable social aspects of science, however, cannot be translated into error—to the extent that *all* science is social, institutional, and rhetorical, revealing those aspects appears to be beside the point and useless for a litigator who wants to gain a tactical advantage. There is, nevertheless, one recurring situation in cases involving scientific testimony: when one side is relying on an idealized account of scientific practice, and the other side's scientific expert is susceptible to attack on the basis that his or her "science" is less than reliable under idealized accounts. The best example of the latter is psychological or psychiatric testimony.

> [Because of the broad] reluctance . . . to admit expert testimony of social scientists with the same deference given to the testimony of those in the

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[82] *See* Ken Hyland, *Boosting, Hedging, and the Negotiation of Academic Knowledge,* 18 TEXT 349, 365 (1998).

> physical sciences[,] . . . disagreements between dueling experts in the physical sciences . . . typically focus on the data . . . which is subject to objective analysis. The certainty of the testimony of social scientists, however, is limited by the nature of their field.[83]

The "trepidation," on the part of a dissenting appellate judge in *United States v. Smithers*,[84] as well as on the part of the trial judge whose reluctance had been challenged on appeal, represents an idealized view of science—note the references to objectivity, determinate data, and certainty. Because the testimony excluded by the trial judge in *Smithers* was eyewitness identification, and "few ideas of social science can match the level of acceptance of many of the research findings in human memory and perception that eyewitness experts relate in their testimony,"[85] the appellate majority confirmed that psychological studies of limitations of perception and memory in eyewitness identification are now a "scientifically sound and proper subject of expert testimony."[86] Indeed, *Smithers* joins a line of cases in which trial judges, who excluded experts on the basis of an idealization of science, have been reversed.[87]

Psychotherapists who appear as experts have been dealing with skepticism for years, and are advised on cross-examination to use the "push-pull technique"—rather than becoming defensive and push back into a defensive posture, "the witness pulls in the same direction."[88] If asked whether critics have considered the clinical interview "a subjective, unstandardized, and unreliable method," the witness does not claim reliability but agrees that some "people say the clinical interview is absolutely worthless and absolutely useless."[89] If asked whether she doubts that she has "done everything possible in such a complex evaluation," she replies that even "after I go beyond all of the routine and expected procedures, I do wonder what else I might have done."[90] And when asked why she has not published even one article, the witness can reply, "[N]ot only have I not published even one article, I also have not given any presentations at any professional meetings anywhere."[91] In such a case, "some witnesses may choose to add that writing articles and making

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[83] United States v. Smithers, 212 F.3d 306, 327–28 (6th Cir. 2000) (Batchelder, J., dissenting).

[84] *See id.*

[85] FAIGMAN ET AL., *supra* note 6, at 381 (citing Saul Kassin, V. Anne Tubb, Harmon M. Hosch, & Amina Memon, *On the "General Acceptance" of Eyewitness Testimony Research: A New Survey of the Experts*, 56 AM. PSYCHOLOGIST 405, 405 (2001)).

[86] *Smithers*, 212 F.3d at 313.

[87] *See* Lewis H. LaRue & David S. Caudill, *Post-*Trilogy *Science in the Courtroom: What are the Judges Doing?*, 13 J. CIV. LITIG. 341, 344–49 (2001–2002) (discussing cases where (i) medical diagnostic reliance on patient reports, (ii) uncertainty, (iii) alternative explanatory models, (iv) reliance on teams, (v) probabilistic analyses, and (vi) work that had not been peer reviewed and published were all considered unscientific at trial but on appeal were found to be characteristic of science).

[88] STANLEY L. BRODSKY, TESTIFYING IN COURT: GUIDELINES AND MAXIMS FOR THE EXPERT WITNESS 164 (1991).

[89] *Id.* at 165.

[90] *Id.*

[91] *See id; see also* Smith v. Ford Motor Co., 215 F.3d 713, 720 (7th Cir. 2000) (publication is not typical for some types of methodology).

presentations is not what they do, so it should not be surprising that they have not published or presented anywhere."[92] This technique can be seen as an attempt to devalue or deflate idealizations of science in the face of attacks that rely on such idealizations.

A final example is the current attack on "evidence-based medicine"—the phenomenon of doctors who make treatment decisions on the basis of current research findings—as potentially biased because of conflicts of interest in biomedical literature.[93] Because the critique of evidence-based medicine relies on an idealized view of science as disinterested, evidence that all of science is "interested" helps to deflate this critique. Ethnographic methodology therefore seems most valuable to the litigator presenting an expert who will be attacked on the basis that such an expert does not meet the idealized standard of science and that the opposing expert will. Indeed, an epistemologically symmetrical analysis—typical among sociologists who do not evaluate science as good or bad but rather seek to show that all science is social, institutional, and rhetorical—"is almost always more useful to the side with less scientific credibility. . . . The side with fewer scientifically or socially credentialed resources is more likely to attempt to enroll [such a] researcher, whereas the better-credentialed side views an epistemologically symmetrical analysis as threatening to its cognitive and social authority . . . ."[94]

From the point of view of those who have adopted an idealized view of science, i.e., as formally constituted without regard to social, institutional, and rhetorical contingencies, a sociological or rhetorical analysis seems to be an attack on science itself—a reduction of all science to junk science. From the sociological or rhetorical point of view, however, a social, institutional, and rhetorical account of science is merely descriptive of how science works, and is, therefore, critical only of idealized accounts. In short, if an attorney anticipates an attack on his or her own side's expert as biased or interested, deposition of the opposing expert should attempt, using ethnographic methodology, to show that all science is "biased" or "interested"—not perniciously but normally— in its very constitution as knowledge.

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[92] *See* BRODSKY, *supra* note 88, at 165.

[93] *See* J. Douglas Peters, *Evidence-Based Medicine in Court*, TRIAL, July 2002, at 74. Peters, from the perspective of a plaintiff's attorney, acknowledges the following: "[E]vidence-based medicine and clinical practice guidelines can be a boon to health care and help ensure just outcomes in civil litigation. But when those guidelines have been corrupted, either directly or as a result of manipulated medical studies, they can be used to gain unjust results." *Id.* at 75. Major "corporations—more so than individual litigants—have the resources to design, define, and fund science that supports their case." *Id.* at 77; *see also* Lars Noah, *Medicine's Epistemology: Mapping the Haphazard Diffusion of Knowledge in the Biomedical Community*, 44 ARIZ. L. REV. 373, 406–12 (2002) (discussing conflicts of interest in biomedical research).

[94] Scott et al., *supra* note 17, at 490.

IV. CONCLUSION

> The establishment of findings in the laboratory as facts accepted by the wider scientific community might turn out to be in large part a social process . . . of gaining credibility.[95]

When one first encounters the growth of the discipline of science studies,[96] their prominence in numerous university programs, and the appropriation of anthropological methodology in ethnographic studies of scientific practice, one cannot help but think that the insights of this field would be useful to lawyers in cases involving scientific expertise.[97] As has been shown, however, science studies do not fit easily into the discourse of law-science relations, where an idealized conception of science predominates. Interest, bias, and motivation are viewed in the courtroom as bases for impeachment and markers of junk science, in contrast to the bases of genuine scientific knowledge—sufficient data and reliable methodology. Evidence that all science is socially motivated, institutionally interested, or rhetorically biased seems to have no place in the courtroom, since it casts doubt on the certitude of *both* sides' expertise. The value of science studies for law is therefore called into question.

On the other hand, if science studies are viewed as a challenge not to science itself but to idealizations of science, then in certain situations—namely when an attorney's expert will be challenged by an opposing expert as not meeting idealized standards—ethnographic methodology could be usefully appropriated. A modest view of science tends to level the playing field in disputes between hard science and soft science experts.

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[95] EMILY MARTIN, FLEXIBLE BODIES: TRACKING IMMUNITY IN AMERICAN CULTURE—FROM THE DAYS OF POLIO TO THE AGE OF AIDS 6 (1994).

[96] Science studies include science & technology studies, the sociology of scientific knowledge, and cultural studies of science.

[97] In such cases, lawyers need to understand how science works.