

What follows is a preliminary and partial draft of a paper in progress, in which I and my co-author attempt to think about the admissibility of expert evidence by offering a taxonomy. This paper has two purposes: first, to sort out the different kinds of expert claims made in (and out of ) court; and second, to trace the varying kinds of support that ought to be required of each kind of claim in order for it to be trustworthy enough to warrant admission. Though still incomplete, this paper will offer useful background for my presentation at the AALS torts conference.

**A TAXONOMY OF EXPERT EVIDENCE:  
INITIAL, PARTIAL, TENTATIVE WORKING DRAFT**

Samuel Gross  
University of Michigan  
Law School  
734-764-1519  
srgross@umich.edu

Jennifer Mnookin  
University of Virginia  
School of Law  
434-924-7810  
jmnookin@virginia.edu

## I. Introduction

Our original assignment was to write a paper on the standards for determining the “reliability” (Justice Blackmun’s term, not ours) of expert evidence that is NOT based on “science.” It didn’t take long to decide that we couldn’t – or in any case, wouldn’t – do just that. The problem is not that the topic is silly; it’s not. There are cases, articles, by now no doubt seminars on it. The difficulties, rather, are the familiar ones of context and boundaries. There is no way to talk about the standards for determining the “reliability” of this type of expert evidence without discussing the “reliability” of *scientific* expert evidence, both because the rules for scientific expertise are (somewhat) better developed, and because the boundary between the two realms is fuzzy. In order to make sense of our assignment it became necessary to think about the standards for “reliability” of expert evidence generally. (We will now stop using quotation marks and trust you to remember that we use “reliability” as Blackmun did *Daubert*– to mean, roughly, “trustworthiness<sup>1</sup>” – and not as the term is generally used in science itself, to mean, roughly, “the extent to which an experiment, test, or measuring procedure yields the same results on repeated trials.<sup>2</sup>”)

Moving up scale in generality is seductive. Once we decided that we had to think about all *expert evidence* it quickly became obvious that the real subject was all *expert information*, whether it is used as evidence or not. This time the reason is not that the boundary line between the use of experts as witnesses and the many uses in other areas is unclear but that the tasks on both sides of a very clear procedural boundary are similar, and (we think) practice on the non-evidence side is often more sensible. Finally, we realized that the criteria for reliability of expert information depend on exactly what experts are do when they answer our questions. Since what they do differs greatly from one case to another, we decided that we had to start with a systematic description of the various tasks that experts perform – a “taxonomy” (which is just a slightly pretentious word for “classification”). In the process, we hope to develop some useful criteria for the reliability of expert information generally, and of expert evidence specifically, and ultimately for the sub-species of non-scientific expert evidence, which is where we started.

---

<sup>1</sup>This is one meaning of the first definition of “reliability” in the Merriam-Webster Dictionary: “the quality or state of being reliable.”

<sup>2</sup>Which is the second definition of “reliability” in Merriam-Webster.

## II. A Couple of Basic Considerations

### 1. Doing vs. Telling

An expert, per Merriam-Webster, is “one with the special skill or knowledge representing mastery of a particular subject.” In court, all witnesses have some sort of special knowledge that sets them apart from most of humanity. For lay witnesses, the distinction is that only they were present and observed particular relevant events that anybody who happened to be there could describe. For experts, the distinction is that only they can perceive and understand particular types of information that the rest of don’t see or don’t fathom. In everyday life we rely on experts constantly – doctors, lawyers, carpenters, mechanics. Most of the time we want them to do things – write wills, set bones, build walls, fix brakes – not talk about them. Most of us have learned the hard way about mechanics and contractors (if not doctors) who have pleasing personalities and give clear, plausible explanations, but do lousy work. Still, we usually want these experts to tell us what they are doing, even if that is not their main task, and sometimes that information is crucial since we, the non-expert consumers, must make critical decisions. It is that informative function that interests us. In court, of course, expert *witnesses* only provide information, evidence; the only thing they *do* is *tell*.

### 2. Reporting vs. Studying

Depending on the issue and the person, an expert might be able to answer a question immediately, from existing knowledge: “Anthrax is a life-threatening bacterial disease that cannot be transmitted directly from one infected person to another.” On the other hand, she may need to collect additional information: “I’ll check and let you know whether this patient has anthrax.” Obtaining additional information, in turn, can mean two things: (1) The expert might need to learn, or brush up on, general knowledge on the topic. This is not very different from answering the question directly; the difference (perhaps one of degree) is between “I have the answer in my head” and “I have the answer in my library.” One way or the other, taking the time to conduct this sort of research amounts to saying “Let me check a general source or two [another doctor or a textbook], and think about it, before I tell you what we know about that [whether anthrax is communicable].” (2) She might need new data about the particular case – an inspection, test results, a medical history, whatever. The effort involved can be minimal (“let me take a quick look”), moderate (“\$150 for an estimate”), or substantial (“I’ll need to do a physical and a series of follow-up lab tests”). Sometimes the effort may be quite extensive indeed: collecting hospital data on employment and then running a set of statistical tests, or conducting a survey or even an epidemiological study. Use of original data makes the expert’s task fundamentally more active than merely reporting existing knowledge. Occasionally an expert who is asked to describe or explain a phenomenon will conduct an original study that adds to the body of general knowledge in the field and may have utility beyond the lawsuit. But whatever the scope of the work, the structural significance is the same: The *telling* part of an expert’s task – for an expert *witness*, this is the only job – often requires some preliminary *doing*: study.

Testimony based on deliberate study is a distinctive aspect of expert evidence, but it is not the

exclusive preserve of expert witnesses. Lay investigators who set out to discover what happened on a particular occasion, may also testify to some of what they find out. This category includes not only the prototypical police and private investigators, but also any other witnesses – most often, parties or their employees – who deliberately collect information about significant past events. What makes studies by expert witnesses different is their permissible scope. The lay investigator who solves a murder may testify about the tracks he saw in the dust, but not about the hearsay statements he heard when conducting interviews (excepting admissions and other admissible hearsay), and he may not give his own interpretation of the evidence in the case. By contrast, the pathologist who testifies to the cause of death may freely rely on a wide range of second-hand information in making up her mind, may testify in detail to her opinions, and may describe a wide range of otherwise inadmissible evidence along the way.

### III. A Taxonomy of Expert Information

The question is: What sort of information do we want from experts? The scheme that follows is a first cut. We realize that the categories we list are not entirely analytically distinct, and that a single expert may well do more than one of these tasks in a given case. (In fact, most of the time, an expert’s testimony will not fit into a single category.) The essential point is to recognize that there are several different types of information that we seek from experts – in court and out – and to try to describe that range. In the scheme that follows, categories of expert information are arranged, more or less, along a rough continuum from specific “factual” bricks that the trier of fact may use to build a wall, to comprehensive “conclusions” that the trier of fact may accept or reject as a whole.

#### 1. Capsule Form

##### **A. Description:**

- (i) Observation: “The brake shoes are worn to within 1 mm of the bracket.”  
“This x-ray shows multiple fractures of the tibia.”
- (ii) Translation: “In English, that phrase means ‘I agree.’”  
“As used in this stock exchange, ‘5p@36’ means ‘I offer to sell 5000 shares of preferred stock at \$36 per share.’”
- (iii) Calculation: “The total payment over the 10 year term of the loan, with compound interest at 7% per annum, will come to \$789,566.”  
“ A racial disparity this large or larger would occur by chance alone less often than 1 time in 100,000.”  
“Net worth, as of 9/10, 2001, was \$238,967,545.”

##### **B. Instruction:**

(i) Facts: “Blood has a PH value of 7.4.”  
“Mitochondrial DNA is transmitted entirely from a mother to her offspring.”  
“Most of the loss of eyewitness memory occurs in the first few hours.”

“Bendectin is not a teratogen ”

(ii) Opinions: “The customary treatment for premature labor is treatment with a tocolytic agent and bed rest.”  
“Epidemiological study is the most persuasive way to establish a correlation between ingestion of a substance and a disease.”

### C. Assessment:

(i) Condition (diagnosis): “Your chimney is unsafe.”  
“The patient is suffering from rheumatoid arthritis.”  
“The person in the photograph is a minor.”

(ii) Causation: “The fractures were may have been caused by a blow from a heavy object.”  
“Tire failure was probably caused by a defect in the fabrication of the tire.”  
“The tumor was caused by exposure to dioxin.”

(iii) Consequences (prognosis): “The patient will be permanently paralyzed from the fifth lumbar vertebra down.”  
“If current levels of phosphates are maintained, all frog populations in the basin will be extinct within ten years.”  
“You need a new chimney.”

(iv) Identity (common source): “The latent fingerprints on the knife came from the defendant’s right hand.”  
“It’s a forgery.”

(v) Value (or quality): “The present value of the plaintiff’s expected life time earnings before the accident was approximately \$1.6 million.”  
“This house has market value between \$375,000 and \$405,000.”  
“This play has literary merit.”

[? (vi) Other Evidence: “The study plaintiff relies on is flawed because of problems with the control group.”

“Cross-racial identification by an eyewitness is more likely to be erroneous.” ?]

## **2. Fuller Discussion**

### **A. Description**

Expert testimony focuses heavily on opinions – sometimes elaborate opinions, as Rule 702 permits – but experts, as that rule says, may also testify “otherwise.” A lot of information from experts is primarily descriptive rather than evaluative. The information at stake may be controversial – expert observers, like lay witnesses may disagree – and expert opinions are frequently, perhaps invariably, built into the foundations of these descriptive statements. All the same, the distinction is meaningful and useful. We discuss three basic forms:

#### (i) Observation

A lot of what experts learn to do is see and hear things that the rest of us miss. The degree and nature of the skill involved varies greatly from one type of expertise to another, but the advantages that many experts have in perception is well known, from umpires (good ones) and coaches, to orchestra conductors, to optometrists. An expert’s observation may be uncontroversial – the expertise involved may consist entirely of identifying the right object (break shoe) and measuring it with the right tool (a calliper ?) – or it might depend on an exercise of judgment that other experts might dispute (“Strike!”). One way or another, the question that this sort of expertise answers is: “What do *you see* [or hear, or feel, or smell]?”<sup>3</sup> In court, expert observations are often crucial, either as the crux of expert testimony or – probably more often – as part of the foundation for more elaborate opinions; and sometimes they are problematic. For example, there are old studies documenting shocking levels of inaccuracy in expert testimony on what is revealed by post-accident X-rays.<sup>4</sup>

#### (ii) Translation

Almost all expert information involves some form of “interpretation,” typically based on skill and training beyond that of the ordinary lay observer. Thus, for example, a radiologist who describes an X-ray as showing a bone fracture is “interpreting” the X-ray; for that matter, a lay person who says that the defendant “agreed” with the policeman is “interpreting” the words the

---

<sup>3</sup>The category we describe as “observations” may include most or all the low level judgements that are “(a) rationally based on the perception of the witness, and (b) helpful to a clear understanding of the witness’ testimony” and therefore admissible as *lay* opinion under FRE 701.

<sup>4</sup>[Cite.]

defendant spoke, or the nod of his head. We use “translation” in a narrower sense, to refer to the restatement in one system of symbolic communication (in American courts, generally everyday English) of a message that was conveyed in a different system of communication.<sup>5</sup> In this case, the question for the expert is some of version “What did *she say*?”

The archetypal “translation” is from one common language into another. The Federal Rules of Evidence recognize that translation is a form of expert testimony, but nonetheless have a special provision for interpreters who perform this function, Rule 604: “An interpreter is subject to the provisions of these rules relating to qualification as an expert and the administration of an oath or affirmation to make a true translation.” In practice, this means that interpreters who provide evidence (as opposed to those who translate proceeding for the benefit of a non-English speaking participant) are treated schizophrenically, depending on the context. Because live testimony cannot proceed if there are disputes about the meaning of the spoken words, an interpreter who translates testimony from the witness stand (unlike almost all other expert witnesses in American courts) is selected by the court, preferably from an official list of pre-qualified experts, takes the special oath provided by Rule 604, and provides (at least prima-facie) authoritative evidence on the meaning of the spoken words.<sup>6</sup> On the other hand, a translator who interprets the meaning of words spoken or written at some earlier time – as memorialized in a document or an electronic recording – is treated as an ordinary “language expert [under Rule 702] who [takes] the stand under oath, and subject[s] himself to cross-examination. Rule 604 is inapplicable.”<sup>7</sup> Since immediate, authoritative translation is not a functional necessity when the words are recorded,

---

<sup>5</sup>[By contrast, Reisinger uses “translation” in a broader sense to describe almost all expert evaluations about the facts of the particular case that the trier of fact is asked to accept on the basis of the expert’s authority. Cite.]

<sup>6</sup>See Court Interpreters Act, 28 USC 1827 et seq.; US v Taren-Palma, 997 F.2d 525, 531-32 (9th Cir. 1993); Us v. Armijo, 5 F.3d 1229, 1234-35 (9th Cir. 1993).

<sup>7</sup>US v. Taren-Palma, supra.

the usual rules for expert witnesses apply, and competing experts may offer different interpretations of statements in a foreign language.<sup>8</sup>

Other sorts of translation are also used in American courts with some regularity. Perhaps the most controversial is expert evidence, generally from a police officer, about the meaning of particular words and phrases in some esoteric underworld community, typically the world of drug dealers.<sup>9</sup> Similar interpretive tasks, however, are very common in any context in which a comparatively small group of insiders in a profession or trade deals with a common set of issues on a regular, repetitive basis; you may need an expert in the diamond trade to tell you what another diamond trader meant,<sup>10</sup>

---

<sup>8</sup>[Cites.]

<sup>9</sup>[Cites.]

<sup>10</sup>[Cite.]

or a pharmacist or another physician to interpret what your internist wrote on the prescription form.<sup>11</sup> As with expert observation, translation (by the expert herself, or by another expert) is frequently a foundational element of more evaluative expert testimony even when translation is not a central or explicit task.

### (iii) Calculation

For this type of expertise, the question to the expert is some variant of “What does it add up to?” Totaling up the grocery bill – even if you have to add sales tax – hardly requires an expert, but many tasks that involve nothing more than a complex set of arithmetic calculations (e.g., preparing a tax return) may benefit from an expert’s help. If the job is big enough and complicated enough (e.g., calculating the net worth of a substantial company), or involves more sophisticated and difficult mathematical operations (e.g., calculating inferential statistics, the force generated by a falling object) expert help is essential for most of us in any context, and always in court where the trier of fact is a lay jury or judge. In that context, part of what the calculation expert will usually do is explain what this *type* of calculation *means*, a separate task that we discuss under the heading “instruction.”

Strictly speaking, calculation itself is absolutely predicable; mathematical operations leave no room for ambiguity. But experts do disagree on antecedent questions: *what* to count, and *how* to do so. As the assumptions that are built into the process become more complex and debatable, the task may slip from “calculation” to “assessment.” As we have drawn the line, determining the net worth of a company is a “calculation,” even though – as we all learned from Enron and Arthur Andersen – there is more than one way to make the many underlying judgments on how to categorize various possible liabilities and assets. On the other hand, we describe the task of estimating the present value of a person’s lifetime earnings if he had survived an accident as an “assessment.” The difference is not so much that this task is more complex or controversial than calculating net worth, but that it requires integrating information on, and making assumption

---

<sup>11</sup>Sometimes obscure shorthand is used by insiders for the specific purpose of making their views obscure to outsiders. For example, in a public defender’s office where I worked as a student, “WPD” meant “white punk on dope,” – a shorthand that facilitated messages, on the *outside* of file folders, such as: “D = WPD. V = WPD. Will settle.” Similarly, I’m told that in some car dealerships the code “ESO” on a form sent back from a mechanic to a “service representative” means “Equipment Superior to Operator” – i.e., “This idiot is complaining because he’s too stupid to operate the machine.”

about, many disparate issues – productive life span, possible career paths, future employment trends and wage rates, productivity and inflation in the economy, and so forth. The location of the boundary line between calculation and assessment is not crucial, as long as we realize that some calculations are based in part on controversial assumptions; that many assessments have calculations embedded in them; and that there are close cases that are hard to call.

## **B. Instruction**

A significant part of what experts do is educate, provide information that will help others make decisions.<sup>12</sup> We focus here on a particular kind of education, something narrower than this general educative function about which others have written; we will call it “instruction.” By “instruction,” we mean information the expert provides that is, in some way, general knowledge rather than specific information about a particular problem or case. It helps answer such questions as: “What do we know about that topic?” and “In general, how does that work?”

In court, instructional testimony can be plucked out of any given case and offered, in essentially identical form, in any other case that raises a parallel issue with different specific facts. As a result, an expert witnesses who give instructional testimony only may repeat the same performance time and again, with no additional input, in different courtrooms with a different cast of characters. In some contexts – perhaps most, maybe even all – there is a tendency for issues that come up repeatedly in the same form, and therefore are subject to this sort of “instruction,” to be transformed over time into legal rules. Thus, for example, the statement “There is no substantial evidence that Bendectin causes birth defects” would have been instructional testimony in 1984, but is now, for all practical purposes, a rule of law.

Instruction, in this sense, typically consists of information that is widely known to experts in the field. It may lead, directly or indirectly, to an inference that is useful for making a particularistic determination in the case, but instructional information is not itself such a particularistic determination. For example, when experts testify about eyewitness identification, their main function is to summarize the social science literature on the topic: they may describe how research indicates that cross-racial identifications are more likely to be erroneous than intra-racial identifications, or that eyewitness confidence is not a good predictor of eyewitness accuracy. This would be “instruction.” By contrast, if an expert testifies that this particular witness’s confident, cross-racial identification was erroneous (or even that it was likely to be erroneous), such testimony (which would probably be prohibited) is no longer instruction, precisely because it is a particular, concrete conclusion specific to the case itself. Instruction provides the necessary background knowledge but *not* the case-specific answers. Of course, experts who *do* provide case specific answers themselves usually incorporate instruction into their delivery, to make their views more comprehensible and persuasive.

We discuss two different kinds of instructional statements: empirical claims about matters of *fact*

---

<sup>12</sup>Of course, at this level of generality, the same could be said of all testimony, lay or expert. For a detailed analysis of experts as educators, see Allen..

in the physical world, and descriptions of social *norms* – customs, common practices, ethical and professional standards, research methodologies, etc. In both contexts the expert gives her views on the state of the world – instruction on norms, in this sense, is factual not normative – but the subject matter is different. That difference has significant implications in court, in part because the information is different, but more because the use to which it is put – defining the norms against which behavior is measured – is quite different from ordinary fact finding.

(i) Facts

Often, experts, in the course of their testimony, provide necessary background facts about the world. They can do so at any level of generality, from universal (“the speed of light in vacuum is 299,792,458 meters per second”) to very particular (“73% of the respondents on this survey did not know the name of either of their United States senators.”) Sometimes these facts are so non-controversial that they may not even be subject to reasonable dispute. These statements, potentially “capable of accurate and ready determination by resort to sources whose accuracy cannot reasonably be questioned,” would therefore be possible subjects for judicial notice rather than expert testimony. That human blood has a pH of 7.4, or that every person (except an identical twin or a clone) has a unique DNA profile, is pretty close to incontestable. Frequently, though, such clearly true statements will be introduced in the course of expert testimony rather than through judicial notice, often because the statements accompany other information provided by the expert that could not properly be judicially noticed. It is nonetheless useful to point out that such matters could, at least in theory, be proper subjects for judicial notice (and hence for judicial instruction). This parallel emphasizes that expert instruction and judicial instruction have a certain structural similarity, in that both can provide background matters for the fact finder to consider in evaluating the specifics of the case.

Other factual instruction may be more debatable. The statements “Most of the loss of eyewitness memory occurs in the first few hours,” or “Animal studies can provide useful information about human dose response,” are examples of expert instruction – they are general statements that an expert could make without having any case-specific knowledge – but they are not themselves, beyond question. Similarly, “Bendectin is not a teratogen” – once controversial, if no longer so – is an example of instruction, for it too is a general empirical claim. By contrast, the statement, “Ingestion of Bendectin by the plaintiff did not cause this limb defect in her offspring,” is no longer instruction – it may follow logically from the general instructional statement (or it may be true even if that general statement is not), but because it is now a particular claim about the individuals involved in the litigation, it would fall into our category of “assessment of causation.”

As usual, effort can make the boundaries fuzzy. Consider, for example, the archetypal nineteenth-century hypothetical question: The lawyer would ask an expert for his purportedly *general* opinion about, say, cause of death, but incorporate into the question (which sometimes went on for pages and pages) a whole series of *particular* facts that happen to be in evidence in the case at hand, and the expert would respond that he did indeed have an opinion about the cause of death assuming these many ostensibly hypothetical facts. In theory, such testimony is framed in general non-case specific form and therefore fits, formally, within our definition of

“instruction.” In practice, if one looks past the formal structure of the testimony to its substance, it is probably better described as an “assessment.”

To sum up: any general claims about the world – whether a report of a single study or a broader conclusion about potential causation derived from that study – are examples of factual instruction. Factual instruction may be practically indisputable – a shot through the heart is capable of causing death – or it may be highly controversial – one witness may claim on the basis of an animal study that PCBs cause cancer while another may contest both the study’s particular conclusion and the more general causal claim about PCB and cancer. Either way, factual instruction concerns matters about which after more tests, more study, and more examination, we could someday reach answers that, if not wholly conclusive, at least have achieved widespread consensus.

(ii) Norms

A different kind of instructional information concerns the norms of a field – typically, customs and standards of care. In a malpractice suit, for example, a witness who testifies about the appropriate standard of care for treatment of primary pulmonary hypertension, is offering instructional expertise. In a sense, her claims are also empirical – the witness is describing either her view of the custom of the field, or her opinion about what is done in ordinary practice, and both of these are empirical claims about the world. These empirical facts, however, are socially created; the expert’s task is not to describe the *best* treatment for a condition, but rather the *standard* treatment. (Ideally the latter will typically conform to the former, but not immediately, not always and not everywhere.) In torts cases involving professionals – doctors, lawyers, accountants, psychotherapists – these instructional opinions are often the heart of the case, the key testimony on the key legal question. Because the content of professional norms is central to malpractice litigation, factual information about these norms is essential. Because this information concerns social norms rather than natural facts, it is treated differently from other types of expert instruction. Outside of litigation, this category of expert information is comparatively unimportant, except to the extent that it is used in less formal attempts to assign responsibility or blame.

**C. Assessment**

*[NOTE: This section is one of the blanks in this incomplete first draft. It’s not unimportant, to say the least, as the examples in the capsule summary illustrate; we have begun to think about it. It may be less essential for the moment because testimony of this type– evaluative statements about the specific factual issues in a case – is more familiar and receives more attention than the other types of expert evidence that we list above it.]*

## IV. Using Expert Information

### 1. General Issues

We will discuss three general issues that need to be considered whenever expert information is used, in court or out: clarity, validity, and bias.

#### A. Clarity

The questions at stake are: “Does he understand what I’m asking?” and “Do I understand what he’s saying in response?” Clarity is not generally an important factor in determining the admissibility expert testimony (except maybe under FRE 403 if it’s a marginal case and a “tendency to confuse” becomes a decisive consideration), but it is an extremely important aspect of presentation that experts and lawyers work on, and it seems to have great influence on the evaluation of expert evidence by juries and judges. As a result (perhaps) we are generally willing to rely on the self-interest of the parties to produce clear expert evidence in court.<sup>13</sup> In fact a special danger associated with the use of experts in court (and no doubt in some other contexts as well) is that the parties and experts will sacrifice accuracy for the sake of appealingly clear but erroneous or over-simplified presentations.

#### B. Validity

The question here is: “Does the expert know what she’s talking about?” This is the core issue for the admissibility of expert evidence. It has three components, all of which are addressed in the *Daubert* trilogy and the current version of Rule 702 – two under the heading “reliability,” and one of under the heading “qualifications.” They are, in descending order of generality: (1) Is this a valid *category* of expert information? In other words, can we, under the best of circumstances, rely on what experts of this sort tell us on this topic? In FRE 702, categorical validity (as determined by the trial court) is a requirement for admissibility: an expert may testify if “the testimony is the product of *reliable principles and methods.*” (2) Can this particular *expert* provide valid information on the question at issue? FRE 702 codifies the rule that the individual witness must be “*qualified* as an expert knowledge, skill, experience, training, or education.” (3) Is this a valid *application* of expertise to the question at hand? Even a qualified expert working in a recognized and valid methodology can do an incompetent job in a particular case. Accordingly, under FRE 702 expert testimony must be “based upon sufficient facts or data,” and the expert must have “*applied* the principles and methods [she uses] *reliably* to the facts of the case.”

#### C. Bias

As with clarity, bias is pervasively important in evaluating expert evidence of any sort, in-court

---

<sup>13</sup>But see discussion of translation of oral testimony, below.

and out: What's the first question that comes to mind when a mechanic at a highway road stop tells you that you need two new tires immediately? And, as with clarity, bias is not a common basis for excluding expert testimony. We hold to the theory that evaluation of bias is a core function and special prerogative of juries as triers of fact; therefore we do not exclude witnesses who may be biased, but allow juries to weigh that factor in judging their evidence. Practice for experts is, in this respect, basically the same as for lay witnesses; in fact, we systematically neglect well-considered plans for the use of comparatively unbiased (or at least, non-partisan) expert testimony as a supplement to potentially biased party-sponsored expert evidence.

As with validity, bias has three components: (1) Is the *field* biased? Do chiropractors, *as a group*, always say that the problem is a misalignment of the spinal column? This is a consideration that might sometimes play a role in a decision that a *category* of expertise is "unreliable" and therefore inadmissible. (2) Is the *person* biased across a range of cases? Is this an expert who always says that the plaintiff had a pre-existing condition, or that toxic exposure caused the disease? In extreme cases this could be an argument against admissibility on the theory that the *expert* is "unqualified;" in practice it is almost always an argument that "goes to the weight" of the expert's evidence. (3) Is this *performance* biased? Has the expert been bribed (or just paid a handsome fee) to say what she did in this particular case? This too is a type of bias that is considered appropriate as a basis for discounting an expert's evidence but not excluding it.

## **2. Applying These Factors**

As we have pointed out, questions of admissibility of expert evidence focus heavily on *validity*, rather than *clarity* or *bias*. But in evaluating expert information across topics and fields, validity is often not the central issue. The effect, as we will see, is that admissibility as such is often orthogonal to the main issues we have to consider: it is not problematic, even for expert evidence of very doubtful value. In the process, we actually do return to our starting point and discuss (among other things) the criteria for determining the "reliability" of expert evidence that is not based on science.

### **A. Description**

"Reliability," as defined by Rule 702, is not a major concern for evaluating expert information that is primarily descriptive. Although questions of reliability may figure in the background in decisions on what to observe, for example, or how to measure it, once attention is focused on a particular item that requires expert description, that concern drops away.

#### **(i) Observation**

The first thing we want to know about an expert observer is her competence: How good is she at this task? This is a question of skill, but if we have no direct measure of skill we are willing to rely on proxies: Does she have the formal training to do the task? Does she use accepted techniques in an apparently competent manner? Bias, of course, is almost equally important; the chimney sweeper who told me (as they all do) that there are dangerous cracks in my chimney is

also a contractor who fixes chimneys.

The most effective way to minimize the danger of incompetence is to reproduce the observation. Out of court we can sometimes ask a second expert with to repeat the observation. Barring that, we rely on character evidence: we use experts who have, in our experience, provided accurate information in the past; or who are said to be accurate by friends and acquaintances; or who are reputed to be accurate. In court, we rely on opposing parties to reproduce observations (if possible), and on testimony on qualifications and on cross-examination to provide character evidence on the expert's competence.

The key to minimizing bias, out of court, is to remove the incentives to distort – for example by consulting a diagnostician who knows he will have no role in the treatment. In court we neglect the most effective method of minimizing bias – using non-partisan experts – and rely instead on cross-examination and rebuttal to expose bias.

Assuming relevance, the only foundational issue for the admissibility of observational expertise under existing rules is the qualification of the expert. On this issue, the treatment of different sorts of experts is likely to diverge, but the divergence does not exactly track the distinction between science and non-science. If the field has elaborate formal qualifications – in particular, if it requires graduate or professional education, and/or certification – we are likely to accept these formal qualifications as sufficient evidence of competence. Most, perhaps all scientists fall into this category – along with many non-scientists. On the other hand, if the skill is based primarily or exclusively on “experience” – the harbor pilot or the chicken sexer – we demand concrete evidence from past practice that the expert can perform this task accurately.

#### (ii) Translation

The main question for a translator is the same as for an expert observer, competence: How good is she at her job? Other than common intelligence, the main requirements for competence are proficiency in the two systems of communication that need to be made mutually intelligible; a Russian language interpreter in an American court must be able to understand and (in the usual case) communicate effectively both in Russian and in English. In terms of admissibility, the only issue is the experts's qualifications, her ability to perform those tasks.

For the common type of translation – from one spoken language to another – unlike other types of expert evidence, we frequently use court-appointed experts. In fact, we rely on them almost exclusively to translate live testimony. The use of official interpreters no doubt greatly reduces the danger of biased translation;<sup>14</sup> it may also help guarantee competence, if the official certification program works as intended. When there are disputes about the accuracy of a translation, the usual method of addressing them (as with other types of expert observation) is replication. That happens sometimes when the words that are being translated are written or

---

<sup>14</sup>Except perhaps to the extent that repeat-player official interpreters develop a bias in favor or against repeat player parties, or categories of parties.

recorded. A party who claims that a translation of a document is biased or incompetent may present her own alternative translation. It is not clear to us, at this point, how disputes over the accuracy of translations of live testimony are handled.

The distinctive feature of the use of this type of expertise is the emphasis on clarity. Because testimonial interpreters are imperative to the on-going functioning of the system of oral testimony in the face of a language barrier, it is essential that they be comprehensible to the participants as they perform their function. As a result, the Court Interpreters Act includes a specific provision for the replacement of an interpreter who does not “communicate effectively” – a problem that in other expert context we let the adversaries sort out.

Translation from less well organized systems of specialized communication presents a different type of problem. When the question is “What signs and words do drug dealers use to convey their meaning without being understood to outsiders?” it is much harder to find well-informed disinterested experts than when the question is “What does this German sentence mean in English?” As a result, there are complaints that the witnesses who provide this expertise are sometimes biased. The classic troublesome case is the police officer who qualifies as an expert in some variety of underworld jargon. In that situation the problem is frequently magnified by the fact that the officer-expert not only has an obvious interest in the outcome of the case, but also testifies as a lay witness to critical acts by the criminal defendant or by others. When that happens, the process of qualifying the officer as an expert – both the imprimatur given by the court, and the character evidence on which it is based – may improperly bolster the officer’s *lay* testimony. And, of course, this takes place in the presentation of the prosecution’s case in a criminal trial, where our concern for accuracy is (or ought to be) at its highest.

### (iii) Calculation

Calculation, like translation, is a task of making sense of information that is already available. It can be done by any qualified expert once the data exist. As with observation and translation, the central issue is the competence of the calculator – a question that can usually be routinely answered by reference to her training and experience. In court, the qualifications of the expert are the only requirement for admissibility of this sort of expertise; mathematics (in itself) is correctly considered to be universally reliable.

In one respect, calculation is easier to evaluate than any other type of expert evidence. Since the results of the mathematical operations are determinate, replication is a perfect check on the accuracy of the calculations themselves. But the underlying data – lay and expert observations rather than calculations – may be in doubt; to the extent that the foundational bases for calculations are hidden and problematic the ultimate expert statements may be in doubt. Also, as we have mentioned, calculations (unlike translation) often incorporate debatable assumptions on what to count and how to do so. In theory, these assumptions can be spelled out; in practice, that may make the information too dense to absorb, and in any case it often is not done. As a result, calculation shades imperceptibly into assessment, and in the process questions of bias and of the reliability of the underlying assumptions become increasingly salient.

## B. Instruction

### (i) Facts

The central question for expert instruction on facts is simply the quality of the information, the accuracy of the message rather than the identity of the messenger. That's also true, of course, for any other type of information, but when the issue is one of specific historical fact we are limited to a finite set of informants ("witnesses") who, because of their physical relationship to those facts, have uniquely valuable information.<sup>15</sup> As a result, we focus a great deal of effort on getting first hand information from those witnesses, and on determining their reliability. In the context of factual instruction, where the issues are ones of general knowledge, we are not limited by the happenstance of potentially unworthy percipient witnesses; we can, in principle, get the best available information in every case.

In practice, getting the best available information is not always easy. A general factual question may have no clear answer. Knowledgeable people may disagree on what the answer is, or whether it is known, or whether the question is answerable. And even if there is a reasonably clear answer out there, it may be no mean feat to find it. None of us can absorb even a tiny fraction of the general knowledge that exists in our extremely complex culture. We have to rely on experts, those who know the issues best – which pushes the problem back a step, to the identification of the most knowledgeable experts.

Out of court we deal with this difficulty in many ways. On routine issues (and often on big ones) we don't invest a lot of energy in screening expert instruction; we look in well-known sources, or ones we're familiar with (the internet, the New York Times), or ask experts we've used before, or who are referred to us by friends and acquaintances. If it really matters, however – if a lot of money, or the future of an institution, or someone's life or health is at stake – we look to the best available proxy for an unmediated statement of the best available information: the consensus of well-informed experts in the field. Of course there may not be a consensus, and if there is it may be out-of-date or just wrong. But that will be the starting point of any serious and well conducted inquiry into general facts outside of litigation; more often than not, it will be the ending point as well.

In trials, where the evidence comes from experts who are hired and examined by the parties, determining the consensus in a field may be difficult. Those who are chosen (on one side or both) may take positions that are outliers in their areas; and one or both sides may have an interest in obscuring the extent of general agreement among experts. To be sure, the background and experience of the speaker may be a proxy for the quality of what is spoken, but it is, at best, a useful but imperfect proxy under any circumstances. Their value is reduced further in court, where expert witnesses are chosen by the parties (from among those who will say what the parties want to hear) in part because they have seemingly impressive credentials. In most cases (on this and other types of expert issues) the qualifications of the expert come into play, if at all,

---

<sup>15</sup>The limiting case is probably information about the speaker's internal state of mind.

in evaluating the weight of her testimony, not its admissibility; if she didn't have strong enough credentials, another expert would have been chosen in the first place. Under *Daubert*, however, courts do sometimes exclude expert testimony on issues of general fact because they conclude that it is insufficiently reliable – that is, they make a preliminary decision on the ultimate value of the testimony in order to decide whether it may be considered at all. This, of course, raises the central problem with the process for screening expert evidence in court: can judges do a good enough job of evaluating specialized information from experts in other fields in which the judges have no competence of their own? There are, of course, several factors judges are supposed to attend to, but when the issue is one of general fact, we suspect that their inquiry ultimately focuses on identifying the consensus (if any) in the field – not consensus of the sort that *Frye* describes – “general acceptance” of the *method* or *technique* – but consensus on the factual propositions themselves.

For easy cases (and they are legion), this issue hardly matters. A lot of factual instruction concerns matters about which there is little or no disagreement – matters on which the community of relevant experts is in strong agreement, or even matters that could be looked up in an appropriate reference source and might be subject to judicial notice. The science/non-science distinction that can be troubling in other contexts is not central here. Some of these matters of (nearly unquestionable) fact might be scientific facts – the pH of human blood or the chemical composition of a substance – while others might be non-scientific facts – the date on which a treaty was signed, or the median income of a given population.<sup>16</sup>

Typically, the admissibility of this kind of factual instruction is not seen as a problem. It is frequently literally not a matter in dispute, simply providing background for the assessments that are contested. The parties might fight about whether a substance found in the defendant's possession was cocaine, but they are not likely to fight about the chemical make-up of cocaine itself; they might disagree about whether defendant's DNA was found at the scene of the crime, or, more likely, about how to interpret the significance of its presence there, but they are most unlikely to do battle over the general premise that a person's DNA is unique (except for identical twins). Thus, for some pieces of factual instruction, there is, practically speaking, no debate about factual accuracy, and hence no creditable argument against admissibility on reliability grounds.

Even for this kind of background factual information, however, there may still be a concern about bias. The issue is less the literal accuracy of the information that is provided, and more a question of what the witness might be leaving out. A testifying expert (like a teacher) chooses what to present from a large array of possible pieces of information; she may select the background facts most useful to her party's case and omit other background information less helpful to her client. This form of bias is almost invariably handled through the adversarial process in rather than through limits to admissibility. Cross examination, and the presentation of

---

<sup>16</sup>How and whether we can distinguish scientific and non-scientific facts is a hard question, but luckily, since in this context the distinction doesn't matter, it is a question that we can avoid tackling.

information by the opposing party are thought to be – and probably usually are – adequate mechanisms for checking partisan impulses to provide partial information. It is hard to imagine exclusion as a remedy for an expert’s fact instruction that was indisputably accurate but also incomplete.

As we move away from facts about which there is little or no disagreement, matters become more complicated. For the moment, we can offer merely some preliminary thoughts.

It may be useful to distinguish between the factual information that an expert presents, and any inferences she draws from that information. In order to be trustworthy as evidence, both levels of an expert’s testimony must be reliable (in the legal sense). For example, an expert might testify that a scientific study published in a peer-reviewed journal found that a substance has a teratogenic effect on mice when ingested at a certain dose. The expert might then go on to conclude, on the basis of that study (perhaps in conjunction with other information, perhaps not), that in her opinion, the substance is a human teratogen. This second claim is still “instruction” rather than “assessment,” since these conclusions remain general rather than case-specific. But there is a greater level of concerns about reliability at that higher level of generality. The study might be biased or poorly-conceived, but even if it is flawless, it might not be a sufficient basis for the expert’s general conclusion.

*Daubert* itself concerned general instructional testimony of exactly this sort: an expert conclusion that Bendectin is a teratogen was excluded as unreliable at trial and on appeal, and then again on remand from the Supreme Court. In *Daubert*, of course, the Court said that the key issue for evaluating reliability is the expert’s “methodology” and not her “conclusions;” in *Joiner*, four years later, the Court acknowledged that the two are often hard to disentangle. But the actual issue in *Daubert*, while related to the distinction between methods and conclusions, is better described in terms of specificity and generality: When does one factual claim legitimately give rise to another, more general factual claim? Or, what specific information is required to permit an expert to reach a general conclusion? When judges evaluate difficult matters of fact instruction, they (as in *Daubert*) may face a doubly hard task: they may need to assess both the reliability of the information itself, and the reliability of the inferences the expert makes on the basis of that information.

This task can become even more complicated if the “conclusion” is itself qualified, or provisional. If an expert testifies that “on the basis of this study, I conclude that this substance might be a human teratogen,” it may be especially difficult for a court to evaluate whether or not this conclusion is justified. If one physician testifies that asphyxiation during labor “frequently” causes cerebral palsy, and another testifies that asphyxiation causes cerebral palsy only in “rare circumstances,” both opinions may be adequately justified by the available research – and in practice, both will be admitted. In the end, the issue posed by such testimony are probably better viewed as questions of sufficiency rather than admissibility: For example, is such a provisional opinion be a sufficient basis for a finding of causation?

To return to our earlier discussion: what we most wish to know about difficult factual claims is whether there is a general consensus among qualified experts for each level of factual

propositions. For example, in a toxic tort case we might like to know whether there is consensus both on the value of the findings of a particular study, and on the claim that the study supports a more general conclusion that substance at issue is a human carcinogen. As we have said, however, on one question or both, there may be no general consensus. If the study was done specifically for litigation, or is not widely known, there may be no consensus on its quality. And the general question may be one to which the relevant community of experts has yet to devote any attention.

If the same exact factual issue is presented repeatedly in many cases, a consensus will probably develop. If the matter is one that is subject to replications and systematic study, it will be, and eventually everybody will agree that asbestos does cause lung cancer, that Bendectin does not cause birth defects, and that silicone-gel breast implants do not cause auto-immune disease: One way or another, these factual statements are now treated as rules of law. But questions that are conceptually identical – whether a rarely used solvent causes liver disease – may occur in a single case, or in three, and never be studied at all. In that situation, questions that are theoretically ones of general fact become, in operation, case-specific evaluations.

Moreover, in some instances, we may not trust an expert community's general consensus. Is this a place where we need to make a distinction between science and non-scientific forms of expertise? Perhaps not. We may be as willing to trust expert historians' claims about the nature of Reconstruction as expert epidemiologists' claims about causation. In both cases, the item that may be the most important for evaluation may also be the hardest to come by: How confident are experts in general about these facts? For some specialties, we may be concerned about systemic bias on that issue, especially when there are structural incentives within the field to overstate its power, or disincentives to test hypotheses and conclusions. This may apply, for example, to professional hand writing experts, and to forensic "scientists" who work in close cooperation with the police and prosecution and have no tradition of research.

#### (ii) Norms

The only essential requirement for an expert on the norms of a community is, obviously, familiarity with that community. In a sense, this prerequisite is much like the knowledge that is required of a translator, except that in this context the expert must be familiar with the *customs* and *practices* of the culture (or subculture) rather than its *language*. Accordingly, in court, the only requirement for an expert *witness* who testifies about professional norms is that she qualify as an expert. Does this a person have sufficient experience to testify about the norms of the community at issue? Any competent endocrinologist can offer opinions about the ordinary and acceptable practice of endocrinologists, and any experienced criminal defense attorney can talk about the norms of her profession. Therefore, for the most part, the question of admissibility of testimony that instructs the court about these sorts of norms, begins and ends with a look at the witness's qualifications – which usually requires no more than membership in the professional group in question.

Note that the ultimate question in cases involving standards of care or custom is *Frye*-like: What is the *generally accepted* practice of a given community? Here however, the "general

acceptability” of a practice is a question for the trier of fact, not a foundational issue that goes to admissibility. Since the content of the norm *is* the question for the jury— and perhaps also because the issue is so thoroughly one of *social* norms – we are willing to admit even idiosyncratic opinions about community norms, so long as these idiosyncratic opinions come from members of the relevant community. The key for determining admissibility is the speaker rather than the substance of what is spoken; we evaluate qualifications rather than the validity of the content of the testimony

There are of course subsidiary issues. For example, how close must the fit be between qualifications and the question at issue? Should a non-specialist physician be able to testify about the custom of a particular medical specialty? Should a family practitioner be allowed to testify about the standard of care in a case involving high-risk obstetrics? Should a properly trained physician who no longer sees patients be allowed to testify about treatment norms? Courts have generally treated these issues as going to weight rather than admissibility, but at some point, a mismatch between the expert’s experience and the norms about which she is testifying may become so glaring that exclusion is appropriate.

As always, bias is an important issue for instructional expert testimony about standards and customs. Two kinds of bias are of particular concern. First, there is partisanship – the bias of the professional expert, who may be all too willing, consciously or unconsciously, to tailor her testimony to suit her client’s needs. Second, there may be a problem of professional solidarity – a tendency to avoid criticism of colleagues. Even if they have no personal relationship, one physician may be reluctant to testify against another local doctor, either out of a sense of professional camaraderie, or because the witness recognizes that the mistake the defendant made was one that she could well have made as well. In addition, there is the general problem of hindsight bias: it may be too easy after the event to criticize actions that were in fact reasonable in light of what was known at the time. All of these issues of bias typically are understood to affect the weight of the evidence but not its admissibility.

*Daubert* and its progeny have had little effect on this kind of instructional testimony. While physicians’ evidence about causation in toxic torts cases has been significantly curtailed in the last decade, physicians’ testimony about standards of care remains substantially unchanged. This lack of substantive scrutiny seems largely appropriate, but with one caveat. This analysis suggests that courts ought to take more seriously the *fit* between the speaker and the community about which she speaks. *Daubert* ought not to mean that the *substance* of standard of care testimony should be evaluated by courts for its validity; rather, the court’s gate keeping responsibility should mean that judges ensure that those who testify about the standard of care or custom of a field are truly situated to know the community standard. Of course, requiring too close a fit may heighten the danger of bias: if only Charlottesville cardiovascular surgeons could testify about the proper standard of care in triple-bypass operations, we might be concerned that the only qualified witnesses would be biased in favor of the defendant because of local professional and community ties; a concern with fit should therefore not be seen as an argument for resurrecting the locality rule. So long as professional communities are defined on a national basis, it ought to be possible to be more careful about fit without unduly limiting the pool of potential experts.

### **C. Assessment**

*[We do hope to have something to say about the evaluation of expert information on what we call “assessments,” but not today. This is probably the most important type of expert testimony in our outline; it is almost certainly the most familiar in practice. In the process, we might get back to our starting point, the criteria for determining the reliability of expert evidence not based on science, because, at least as the distinction between science and non-science was drawn in Kumho Tire, the non-science column includes the dominant type of expert evidence in American courts: case-specific clinical assessments by physicians.]*