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Third Arms, Scottish Sheep, and *Jurassic Park*: Understanding Scientific Evidence

Scientific evidence can seem daunting. Many lawyers feel much less comfortable dealing with it than they do with other types of evidence. Being intimidated by an opposing expert, or lacking the confidence to explain complex principles to a judge or jury, can leave a lawyer feeling handcuffed with respect to what can sometimes be the most critical evidence in her case.

Such feelings may be the result of overestimating the complexity of scientific evidence and underestimating a lawyer's own ability to work with and against it. The purpose of this article is to encourage defense lawyers to become comfortable enough with scientific evidence to treat it the same way they treat the other types of evidence in their cases.

It is important that lawyers learn the science.

If there is a chance that her case might turn on some issue of scientific evidence, a defense lawyer needs to master that evidence — including the underlying scientific principles — to the same degree as any other evi-

dence. If it is the government's witness, the defense lawyer needs to be able to minimize the effect of the testimony while looking for opportunities to build the defense case through the adverse witness. If it is a defense witness, defense counsel needs to be able to work the scientific evidence effectively into her presentation, without unwittingly putting the expert in a position to bolster the government's case on cross-examination. And there is simply no way to accomplish all of this without a firm grasp of the underlying science.

Nor is it sufficient to outsource the “science stuff” to the defense expert. As discussed below, it can indeed be incredibly helpful to have that expert at the lawyer's side, for consultative as well as testimonial purposes. But that is not an adequate substitute for the lawyer's own mastery of the subject matter. A defense lawyer cannot expect to cross-examine a hostile expert effectively in real time, or present the defense's scientific evidence in a way that works seamlessly into the rest of the case, without a firm grasp of the evidence and the concepts and data underlying it.

The defense lawyer's situation is similar to that of an author whose novel revolves to some degree around scientific concepts. The late Michael Crichton, for example, always did a good job of learning the relevant science well enough to weave it effectively into his stories. Imagine, however, if in one of his novels — *Jurassic Park*, for example — he had simply hired paleontologists and molecular biologists to write the parts of his book dealing with dinosaurs and DNA. The book would not have flowed smoothly, but would instead have lurched back and forth with obvious breaks between captivating storytelling and technical analysis.

The same is true for a defense lawyer, whose task

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includes putting various fragments of evidence into a coherent, compelling story. If some of those fragments are scientific, counsel needs to understand them well enough to work them in herself instead of outsourcing the job.

Can defense lawyers really hope to understand complex scientific evidence?

An old joke goes something like this: An astronomer, a physicist, and a mathematician are all taking their first trip to Scotland. As they look out the window of their train, they see a black sheep. The astronomer says: “Interesting — apparently the sheep in Scotland are black.” The physicist says: “Well, all we can really say is that at least some sheep in Scotland are black.” The mathematician says: “Actually, all we can say for sure is that at least one sheep in Scotland is black on at least one side.”

The joke illustrates an important point. Science, at bottom, is about inferences — taking a certain number of observed data points and trying to draw broader conclusions from them. And the evaluation of scientific statements or propositions essentially consists of assessing whether those data points are sufficient, in number and significance, to support the proposed inferences.

Consider the Scottish sheep again. What would the three travelers need to do to convince someone that all sheep in Scotland — or a significant number of the sheep in Scotland, or two-thirds of the sheep in Scotland — are black? How many sheep would they have to observe? What might they do to demonstrate that the subset of sheep they observed accurately represented the entirety of Scottish sheepdom? How could they make sure that they were not ever counting the same sheep multiple times?

Those questions are not overwhelmingly complex. Indeed, that process of evaluating a proposed inference and considering whether the underlying evidence sufficiently supports it should seem natural — it is what lawyers do every day. And although the data points or principles underlying a particular form of scientific evidence may be more intricate than sheep-counting, at bottom the inferences have to stand or fall on their merits. In other words, something that is not inherently convincing does not become convincing simply because it is called “science” or presented by a “scientist.” And a good defense lawyer should be the ideal

person to take a critical look at the evidence at issue — with appropriate technical assistance, as discussed below — and evaluate how meritorious it really is.

But can defense counsel understand this evidence at the same level as the ‘experts’?

More often than one might think, a defense lawyer can understand scientific evidence at the same level as an expert in the field — or at least well enough to be confident in her ability to deal with it in her case. And why not?

Experts do not have any additional lobes in their brains. Yes, many of them are quite intelligent, but so are good defense lawyers. Thus, at the outset, counsel should ask herself what the basis is for the expert’s allegedly specialized knowledge, and see if it is something she can replicate in herself.

The degree to which the defense lawyer will be able to do this will obviously depend on the nature of the expert’s field. Many experts essentially perform a pass-through function, transmitting knowledge that is shared broadly within a field and often set forth in technical literature. For example, consider a government DNA expert testifying about the estimated frequency of occurrence of a particular DNA profile. This expert is not really conveying his own personalized knowledge, but instead is effectively serving the function that would be served by providing reference materials to jurors. In many ways it is easiest to prepare for this type of expert because defense counsel has access to the same literature the expert does.

If the defense lawyer can familiarize herself with the leading references in the field, she may find herself on a near-equal footing with the expert for the purposes relevant to her case — or at least with enough understanding that she can critically assess the evidence and identify any weak points. For example, the same literature that supports the expert’s testimony often refers to limitations and uncertainties that may cast doubt on the expert’s conclusions.

As someone not in the field, defense counsel may find that literature dense at first, but she may be surprised at how often she will be able to understand the critical issues. If the lawyer’s concern is that she will never be able to replicate the expert’s entire body of training and education in the time available to prepare for the case, the fact is that that is probably

not necessary. Most of the time, the specific issues in a case will center on a manageable number of basic principles that probably comprised a small fraction of the expert’s overall education. It is rare that any of those individual concepts are too difficult for a good lawyer to understand — remember, the expert was able to learn them, and he does not have a “third arm” (see sidebar below) or extra brain lobe.

Of course, not all experts testify by passing along objectively verifiable, published knowledge. Some expert testimony is more subjective and experiential in nature, such as the doctor who testifies that in his experience he generally sees certain physical signs after particular types of injuries. These experts can be harder to prepare for — there may not be a fixed body of literature to focus on, and it can be much more difficult for defense counsel to replicate in herself the body of knowledge allegedly gained through many years of “data” experienced personally and subjectively by the witness.

On the other hand, the subjective and undocumented nature of this evidence can make it inherently less compelling and more susceptible to a good cross-examination. In addition, even with these “experiential” experts there is often *some* body of literature in the broad field underlying the testimony. If defense counsel familiarizes herself with this literature, she may find that the consensus in the field is that the type of determinations at issue cannot be reliably made, or perhaps that there is in fact a set methodology that this witness eschewed in favor of his “experience.” Even the existence of

Some years ago, Kevin Sali coached a high school wrestling team in Miami. His team was from a small (“4A”) school and generally competed against other schools in the same category. Occasionally, there would be an open tournament in which Sali’s kids could end up wrestling kids from the bigger (“5A” or “6A”) schools. When that happened, typically Sali’s wrestler would run up and tell him, with some trepidation, that he had drawn a “6A kid.” Sali usually responded by asking, “Does he have a third arm?” In other words, is there something about this kid that makes him fundamentally different from you? If not, get out on the mat and take your best shot. In some respects, the same is true with expert witnesses.

technical literature on other topics in the field may be enough to raise questions about why this witness's theories, if valid, are not set forth in the type of literature that people in the field write when they want to share the benefits of their knowledge with others or subject their theories to the judgment of their peers.

If defense counsel really starts digging into the scientific evidence at issue, she may find that it is significantly less substantial than it may have appeared at first glance, and perhaps entirely unworthy of the aura of credibility that tends to attach to expert testimony. She may also find that the purported expert's "specialized knowledge" is not as formidable as she may have feared. Gerry Spence, for example, writes in *The Smoking Gun* about a supposed expert witness who admitted on cross-examination that his sole source of expertise was a single article that he had read. (Spence asked him if someone who had read two articles would be twice as much of an expert.)

This is not to say, of course, that all purportedly "expert" testimony is groundless or significantly flawed. Many experts are indeed highly qualified, and their testimony may well consist of legitimate science applied in a way that is fair and not misleading to the facts of particular cases. But defense counsel will never know unless she takes a hard, critical look at the scientific evidence at issue, and she cannot do that without grounding herself thoroughly in the underlying principles and the manner in which they were applied in her case.

Mastering the evidence requires multiple steps.

One early step in mastering the evidence is to collect all of the available documents relating to the scientific evidence at issue. This includes both case-specific and general materials.

Case-specific materials include all reports associated with the evidence. Along with the actual analytical reports, counsel should obtain reports relating to any aspect of the collection, handling, storage or treatment of any associated samples or other physical items. Counsel should also ask for bench notes and other rough or preliminary materials, not all of which are routinely produced in the ordinary discovery process. Any potentially relevant correspondence — for example, emails between government experts and prosecutors — should also be requested.

General materials include protocols, standard operating procedures ("SOPs"), and other reference materials associated with the type of evidence at issue. In addition

to materials relating to particular tests or methods, counsel should find out if there are documents relating more broadly to the collection and handling of physical evidence.

The procedures for obtaining all of these materials will depend on the jurisdiction's laws, local custom, and the circumstances of the particular case. The materials may be encompassed by the prosecutor's discovery obligations or may be available through the subpoena process. Alternatively, the jurisdiction's public records laws may require the relevant agencies to produce these materials upon request. In appropriate cases, informal discussions with prosecutors may result in voluntary production of at least some materials.

Whatever the mechanism, the gathering of these materials is something that should begin early in a case. Production can take time, especially if court intervention is necessary. Additionally, counsel's initial review of the materials can reveal the need for other documents. For example, SOPs frequently cite underlying reference materials that may be illuminating. Accordingly, an early start is essential.

If resources permit, counsel should also retain a consulting expert. It may be helpful to do this before beginning the document-gathering process described above, as the expert may provide guidance regarding which materials to get. Of course, the selection of an expert may be influenced by what counsel sees in the materials, so in some cases this order may be reversed (counsel can always pursue additional documents after initial consultations with the defense expert).

There are a number of ways to find a good consulting expert. Fellow lawyers who have dealt with similar types of evidence may have recommendations. Email listserves enable lawyers to seek input quickly and efficiently from a large num-

Sometimes expert testimony does not merit the trustworthiness people give it. "In one of my own cases," Kevin Sali remembers, "the government offered a witness as an expert in using algae in water to prove the existence of nearby pollution. When I asked the witness to describe the basis of his algae-related expertise, he claimed it was based in part on 'you know, kind of first-hand experience of, you know, visiting places like an aquarium where you see algae and stuff growing.'"

ber of colleagues. NACDL and some of its state counterparts maintain databases listing experts in various fields. Nearby universities, which generally have online directories describing professors' areas of research and experience, can also be good places to find experts.

Once counsel has retained an expert, there are many ways to benefit from his services. Before going further, however, a cautionary note is in order. Although communications with an expert employed solely for consultation will generally be privileged, the same is not true for testifying experts. Even if counsel initially anticipates only consultative use, she may ultimately decide to use the expert at trial — if, for example, the expert is unusually appealing, or resources do not permit hiring a separate testifying expert. Accordingly, all communications with the expert should be conducted in light of the possibility of future disclosure to the prosecution.

This includes the sharing of documents with the expert. Here, there is a risk of error in both directions. Counsel should assume that all materials provided to the expert will be subject to disclosure if the expert is later designated as a trial witness,¹ so great care should be exercised before certain materials — particularly confidential materials — are shared. On the other hand, withholding potentially relevant materials may give the prosecutor an opportunity to argue that the defense expert's opinions are based on a misleadingly incomplete factual picture. Ultimately, the decision of how much to share with the expert will depend on the circumstances of the particular case, but all of these factors should be considered.

From this point on, the learning process is a combination of consultation with the defense expert and review of the technical materials. As a defense lawyer becomes more comfortable with scientific evidence, she may find herself increasingly relying on her own review of the literature. The expert can still be useful in this process — not only in helping the lawyer to understand that literature, but also in directing her at the outset to the materials considered most reliable in the field.

There is a special benefit to this latter type of guidance. Technical literature can be helpful not only for education, but also for ultimate use at trial. Evidence rules generally allow attorneys to present this literature to the jury in some form, provided that certain foundational requirements are met.² The federal rules, for example, require that the material be "established as a reliable authority by the expert's admission or testimony, by another expert's tes-

timony, or by judicial notice.”³ Early consultation with a defense expert can guide a lawyer to the literature that is most likely to meet these requirements, and thus help the lawyer to develop a corresponding trial strategy.

Throughout this process, a defense lawyer should not be afraid to exercise her own judgment regarding the value of the scientific evidence at issue in her case. If something about an opposing expert’s anticipated testimony seems suspect, or if there is some potentially helpful avenue that the defense expert has not mentioned, counsel should not be shy about following up on what her own instincts tell her. She should look to see if there is any literature in the field that supports what she is thinking. She can ask her expert if there is anything inherently wrong with her ideas, or if any additional background information should be taken into account. It may be that the views initially set forth by the experts in the case are in fact the most logical, but defense counsel should not automatically make that assumption.

Preparation is the key.

Working with scientific evidence can be a challenge, especially given the sub-

stantial weight judges and jurors often give it. But for that very reason, defense lawyers owe it to their clients to understand that evidence and the principles underlying it. Fortunately, this is not as daunting a task as it sometimes seems. With proper preparation, defense lawyers can master scientific evidence just as they master the other critical evidence in their cases.

Notes

1. This will not necessarily be the result. If counsel can convince the court that certain materials were not relied upon by the expert in reaching his opinion, those materials may not need to be disclosed. Regardless, because it is difficult to predict in advance how a court may rule on this issue, caution is appropriate.

2. See, e.g., FED. R. EVID. 803(18) (hearsay exception for “[a] statement contained in a treatise, periodical, or pamphlet if: (A) the statement is called to the attention of an expert witness on cross-examination or relied on by the expert on direct examination”; providing that “[i]f admitted, the statement may be read into evidence but not received as an exhibit”); cf., e.g., OR. REV. STAT. § 40.430 (the corresponding Oregon rule, which provides that such materials may only be used on cross-examination, and that they

“may be used for purposes of impeachment but may not be introduced as substantive evidence”).

3. FED. R. EVID. 803(18)(B). ■

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