Judging Science

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1. Introduction

The authors of this paper have had the pleasure of living in two different, co-existing universes: those of science and engineering, and; the law. They are not the same.

These universes intersect in legal cases involving science and technology, including medical malpractice, class actions involving product liability and, particularly for the Federal Court, patent cases.

Judges have railed about the inappropriateness of the judicial system resolving what are essentially scientific debates in patent and other technical-based legal disputes.

> When one considers the apparent silliness of trial by a judge who is utterly unschooled in the scientific substance of a patent, hearing conflicting testimony of so-called experts who speak the antithesis of scientific verity, and lawyers who have been engaged in the particular case for years before the trial, one knows that this field cries out for reform. It wastes the scarce resources of the Court, which is not configured for getting at the truth of arcane scientific contradictions. A judge unschooled in the arcane subject is at difficulty to know which of the disparate, solemnly mouthed and hotly contended "scientific verities" is, or are, plausible. Is the eminent scientific expert with the shifty eyes and poor demeanour the one whose "scientific verities" are not credible? Cross-examination is said to be the great engine for getting at the truth, but when the unschooled judge cannot perceive the truth, if he or she ever hears it, among all the chemical or other scientific baffle-gab, is it not a solemn exercise in silliness? Reform is much needed in the field of non-mechanical patents' litigation. [1]

In his paper[2] suggesting how this problem might be reformed, Mr. Justice Muldoon asked this frightening rhetorical question:

> How many patent or trade-mark cases have been resolved on the credibility – or otherwise – of expert witnesses, when in fact the resolution ought to have turned on objectively deciding their intellectual property rights or duties?

Likewise, scientists and inventors have railed at the inability of the judicial system to deal with technical disputes. After receiving recognition by his fellow engineers for having invented the technology behind FM radio, and the U.S. Supreme Court (including Justice Cardozo) holding otherwise, Edwin Howard Armstrong offered to return the honour that had been bestowed upon him to the Institute of Radio Engineers, in Philadelphia, U.S.A., on May 29, 1934. Mr. Armstrong said, in referring to his time spent in patent litigation (unsuccessfully to that point):

> It is a long time since I have attended a gathering of the scientific world - a world in which I am at home - one in which men deal with realities and where truth is, in fact, the goal. For the past ten years I have been in exile from this world and an explorer in another - a world where men substitute words for realities and then talk about the words. Truth in

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[1] *Unilever PLC et al* v. *Procter & Gamble Inc. et al* (1993), 47 C.P.R. (3d) 479 (F.C.T.D. per Muldoon J.) at p. 488-9.

[2] Muldoon, The Hon. Francis C.; "Addressing the Technical Side of Patent Litigation – Educating Judges with no Technical Training"; 9 C.I.P.R. 25 (1992) at p. 30.

> that world seems merely to be the avowed object. Now I undertook to reconcile the objects of these two worlds and for a time I believed that could be accomplished. Perhaps I still believe it - or perhaps it is all a dream.[3]

The Fundamental Problem

We respectfully submit that the reason for the dysfunctionality between the law and science and technology is based upon one fundamental, underlying problem:

> Most Judges do not understand that, at their most fundamental level, **science and technology work by following the Scientific Method** and that "Scientific Truths" are those theories that can withstand the scrutiny of experiment.

This fundamental problem is often further compounded by a misapprehension by judges that:

> **Science and technology are hard to understand.** Science and engineering can be difficult to do, but science and engineering need not be hard to understand. A willing student can easily understand science and technology when taught by a good teacher.

Recognizing that the trial of a science or technology-based case is a learning situation, judges should do their best to be attentive students, and should impose high demands upon the expert witnesses who teach them about science and technology.

2. What is Science?

The big great universe is all around us – and what a wonderful collection of atoms we are that we are aware of it and can spend time observing it and learning how it works.

When we look at our universe, we can only look at a small part of it at any one time, and so, we collect information, like pieces of a jigsaw puzzle and try to gain an understanding of the whole picture.

Sometimes we recognize patterns. These patterns help us to group things together and express generalizations that describe everything within the group. It is these human-made generalizations that we call the "laws of science" or "scientific theories".[4]

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[3] quoted by Tom Lewis in "*Empire of the Air, The Men Who Made Radio*"; Edward Burlingame Books, 1991. Mr. Armstrong committed suicide by jumping out of his 13th floor apartment building in New York City on February 1, 1954. By 1967, Marion Armstrong, Edwin Armstrong's widow had won the last of all of Armstrong's FM patent lawsuits.

"Science", therefore, is the study of everything around us and the creation of generalized rules that nature seems to obey.

Science is not reality – it is our explanation of reality.

"Scientific Truth" = The Scientific Method

The most important principle of science is that:

> **"The test of all knowledge is experiment."**

Experiment is thus the sole judge of "scientific truth”.[5]

A scientific theory that can withstand the rigours of experimental testing is a theory that can be relied upon to predict the future behaviour of a similar scenario. It is analogous to a legal precedent: a future result can be predicted by a reliable theory based on past experience.

The method that is always followed in a properly run experiment is referred to as "the Scientific Method".

The Scientific Method is usually described as a linear sequence:

> In Step "A": a hypothesis or theory is made: "If I do this, then based on my experience and understanding, I predict that such-and-such will happen."
>
> In Step "B" the experimental apparatus is put together and the experiment is conducted.
>
> In Step "C", the observations are made and the data collected.
>
> In Step "D", the observations and data are analyzed and conclusions are reached as to whether the observations agree with the result predicted by the hypothesis or theory. If the observations and conclusions are consistent with the hypothesis or theory, then they are considered to be "true". If they do not, then the hypothesis or theory is incorrect and a better theory, which is consistent with all the observations, must be derived.

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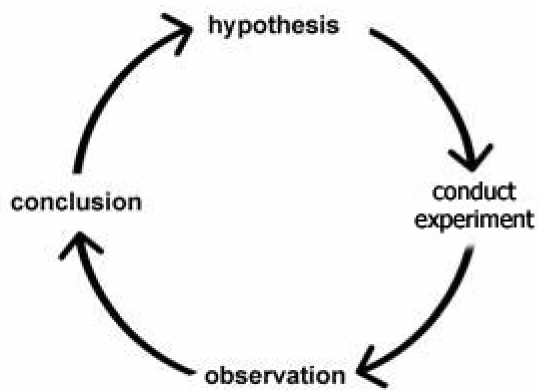
[4] The terms "laws of science" and "scientific theories" are used almost interchangeably in science. The "laws" are often theories that have survived scrutiny longer but, as they are all human constructs, neither are immutable.

[5] In the first chapter of his classic series of physics lectures, "The Feynman Lectures on Physics" (Addison-Wesley, 1963, Vol. 1, Chapter 1, page 1), Dr. Richard Feynman phrased it this way:

> "The principle of science, the definition, almost, is the following: *The test of all knowledge is experiment*. Experiment is the *sole judge* of scientific "truth".

Strictly speaking, experiments never prove that a theory is correct, they merely prove that the theory was not incorrect. So long as a scientific theory is not disproved by an experiment it remains "scientifically true". Any theory that is disproved by experiment is false, but, as discussed below, may still have some utility in limited circumstances.

A more apt description of the Scientific Method, we suggest, is that of a repetitive process, represented by the same four steps described above, only arranged in a circle.



More often than not, the Scientific Method begins with an observation which leads one to ask questions as to why things happen the way they do. A conclusion is drawn and a theory created, which is then tested by experiment.

Like the circle, the Scientific Method can be an endless sequence of asking "Why did that happen?" and "I wonder what would happen if…".

Observations that match our theories are comforting because they reinforce our confidence in making scientific predictions based on a "proven" theory. But it is when something unexpected happens, that we realize that we did not fully understand things beforehand. As stated by science writer Isaac Asimov:

> "The most exciting phrase to hear in science, the one that heralds the most discoveries, is not "Eureka!" but "That's funny..."

The failure of a scientific theory to predict observations is often considered by non-scientists as a failure of science and a bad thing. In fact, it is a good thing. Science thrives on scrutiny and invites experimental "criticism". When an old theory is disproved by experiment, the old theory must be replaced by a new and better theory that is consistent with all observations.

Thus, thanks to the Scientific Method, better "scientific laws" evolve under the scrutiny of experimentation.

There is nothing wrong with approximations

Most of our current scientific laws are only approximations due, in part, to our lack of understanding, even amongst the best of scientists, as to how everything in our universe works. We are still learning and refining the scientific laws.

Our old, "incorrect" scientific laws can still be used to describe what is happening around us, so long as such use is limited to situations where they are "close enough". For example, the theory that the earth is flat, although incorrect, still has utility on a soccer field where the effect of the curvature of the earth is so small as to be unnoticeable.

Scientific experiments have shown that clocks in vehicles that have accelerated to high speeds (such as in satellites) run slower than stationary clocks. Einstein, in his Theory of Relativity predicted this "time dilatation" effect would happen as the speed of an object increased towards the speed of light. Scientists still do not completely understand why this happens. Nevertheless, it does. Einstein's theory is scientifically true because it conforms to observed experimental results.

Do we really care? The answer is: it depends. When you travel home at night, your watch and the wall clock at home appear to have run at the same speed. In fact, your travelling watch measured the time of your commute to be slightly less than the same commute measured by the stationary clock in your home. For your practical purposes, Einstein's time dilatation effect doesn't really matter. But had you been tracking your location by a global positioning system (GPS), the satellites measuring your position would have factored in Einstein's time dilatation effect to provide a more accurate calculation of your position.

The experimentally verified observation, that time passes at different rates depending on the acceleration of the clock, is the "true" law. The old law that everyone's clock time runs at the same rate is fundamentally wrong, but is "approximately true" or "close enough" for our everyday commute.

The key in science or engineering (and in judging cases dealing with such subjects) is to know when it is appropriate to use what scientific law or theory.

3. What is Engineering?

Engineering is the application of science to achieve practical results. Generally speaking, patents relate to "applied science": the application of scientific principles to make useful machines, methods and compositions.

In a sense, Engineering is like Law. Engineering modifies things; the Law modifies the behaviour of society. Both attempt to change things to make them behave differently than they otherwise would have. Both, hopefully, work towards a pre-meditated and properly designed solution. Both require iterative corrective changes to react to changing circumstances or events or to create better solutions.

Science in the Courtroom

Whether it is the understanding of science in the laboratory or the judging of science in the courtroom, they key is "the Scientific Method".

In giving technical evidence, honest scientists and engineers will present explanations and theories that can or have withstood the scrutiny of experimentation. The evidence of honest technical experts is rarely contentious when dealing with the science itself. The disagreements usually come from the characterization of phenomenon (in the case of patent claim interpretation, as discussed by Mr. Armstrong, above) or the hypothetical behaviour of scientists or engineers (in determinations of the obviousness of an invention). The evidence of technically dishonest experts can likewise be disproved by experiments.

The Scientific Method is part of the current test for excluding "junk science"[6] from the Courtroom. In cases involving novel arguments of causation (typically in class action lawsuits involving diseases allegedly caused by medicines, hydro wires or implants), the United States Supreme Court appears to have abandoned the test of "scientific orthodoxy" to one of determining whether the theory survives the scrutiny of the Scientific Method.

In *Daubert*[7], the U.S. Supreme Court held that the judge must act as a gatekeeper, screening the evidence to ensure that it is truly scientific:

> "The subject of an expert's testimony must be "scientific . . . knowledge." [n.8]. The adjective "scientific" implies a grounding in the methods and procedures of science. Similarly, the word "knowledge" connotes more than subjective belief or unsupported speculation. The term "applies to any body of known facts or to any body of ideas inferred from such facts or accepted as truths on good grounds." Webster's Third New International Dictionary 1252 (1986). Of course, it would be unreasonable to conclude that the subject of scientific testimony must be "known" to a certainty; arguably, there are no certainties in science. See, e.g., Brief for Nicolaas Bloembergen et al. as Amici Curiae 9 ("Indeed, scientists do not assert that they know what is immutably `true'--they are committed to searching for new, temporary theories to explain, as best they can, phenomena"); Brief for American Association for the Advancement of Science and the National Academy of Sciences as Amici Curiae 7-8 ("Science is not an encyclopaedic body of knowledge about the universe. Instead, it represents a <u>process</u> for proposing and refining theoretical explanations about the world that are subject to further testing and refinement") (emphasis in original). But, in order to qualify as "scientific knowledge," an inference or assertion must be derived by the scientific method. Proposed testimony must be supported by appropriate validation--i.e., "good grounds," based on what is known. In short, the requirement that an expert's testimony pertain to "scientific knowledge" establishes a standard of evidentiary reliability."

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[6] According to Peter Huber, author of "Galileo's Revenge: Junk Science in the Courtroom", Harper Collins, 1991, since the time of Galileo, science and the Courts have not interacted well. The term "junk science" refers to theories posing as science but which are not supported by experiments.

[7] *Daubert* v. *Merrell Dow Pharmaceutical, Inc.* 509 U.S. 579, (1993).

The trier of fact must determine whether the evidence is "scientific knowledge". Is the reasoning or methodology underlying the testimony scientifically valid? In other words, the judge must test the evidence through the eyes of a scientist, to see whether it survives the Scientific Method.

> "Ordinarily, a key question to be answered in determining whether a theory or technique is scientific knowledge that will assist the trier of fact will be whether it can be (and has been) tested. "Scientific methodology today is based on generating hypotheses and testing them to see if they can be falsified; indeed, this methodology is what distinguishes science from other fields of human inquiry." Green, at 645. See also C. Hempel, Philosophy of Natural Science 49 (1966) ("[T]he statements constituting a scientific explanation must be capable of empirical test"); K. Popper, Conjectures and Refutations: The Growth of Scientific Knowledge 37 (5th ed. 1989) ("[T]he criterion of the scientific status of a theory is its falsifiability, or refutability, or testability")."

The terms "falsifiability, refutability or testability" sound like bafflegab coined by a jargonist – they are not ones that come from the realm of science or engineering. Perhaps the test should have been expressed in less convoluted language: "Can the scientific theory being proposed (i.e. do overhead powerlines or silicone breast implants cause cancer?) survive the scrutiny of the Scientific Method?"

A further consideration in *Daubert* is whether the theory or technique has been subjected to peer review and publication. By asking this question, the Courts are asking "Have other scientists decided that the theory passes the scrutiny of the Scientific Method?"

> "… submission to the scrutiny of the scientific community is a component of "good science," in part because it increases the likelihood that substantive flaws in methodology will be detected …. The fact of publication (or lack thereof) in a peer reviewed journal thus will be a relevant, though not dispositive, consideration in assessing the scientific validity of a particular technique or methodology on which an opinion is premised."

Two other considerations offered in *Daubert* are:

> What is the error rate of a particular technique? and;
>
> Are there standards controlling the technique's operation?

The former asks whether the result has statistical validity; the latter whether there are generally accepted ways of running the technique (again asking, "Is this good science?").

Chief Justice Rehnquist, in his dissent in *Daubert*, warned the Court about making its own determinations as to scientific validity:

> "I defer to no one in my confidence in federal judges; but I am at a loss to know what is meant when it is said that the scientific status of a theory depends on its "falsifiability", and I suspect some of them will be, too.
>
> I do not doubt that Rule 702 confides to the judge some gatekeeping responsibility in deciding questions of the admissibility of proffered expert testimony. But I do not think it imposes on them either the obligation or the authority to become amateur scientists in order to perform that role. I think the Court would be far better advised in this case to

> decide only the questions presented, and to leave the further development of this important area of the law to future cases."

The Court does not have to become an amateur scientist to determine whether the Scientific Method has been followed any more than a judge in a medical malpractice case has to become an amateur doctor to determine whether the wrong procedure was used. Expert witnesses would be glad and able to advise the Court whether the Scientific Method was followed or not, and with an understanding of the Scientific Method, we suggest, a judge who learned enough about the science to understand how it was done could make a reasoned decision on whether the Scientific method has been followed in a particular case.

4. Learning and Understanding

Learning and Understanding technology has everything to do with attitude. If you want to learn, you can be taught; if you don't, you can't. As Henry Ford said, "Whether you believe you can do a thing or not, you are right".

Madam Justice Barbara Reed, in the context of expert witnesses in patent trials, put it this way:

> "I operate from the assumption that it doesn't matter how complex a matter may be, it can be made simple enough that I can understand it. It can be explained in terms without using jargon. If that doesn't happen, I jump to the conclusion that the side that is putting forward the inarticulate expert is trying to snow me and doesn't have a good case."[8]

Interestingly, she points implicitly to the necessary components for efficient learning:

good students;
good teachers; and
an appropriate exchange.

We deal with each of these components below.

Judges as Good Students

A trial is a formidable place not only for witnesses, but also for a judge, particularly when the judge has no background, knowledge or experience in the technical area being discussed. What the judge must understand, however, is that the courtroom is a form of classroom. The judge is the student and the expert witness and counsel are the instructors. This is a classroom unlike any other because the student is in charge.

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[8] "Preparing to be an Expert Witness"; Canada Law Book video; 1996.

Don't Be Afraid to Ask

Judges can also help themselves by asking questions.

The prerequisite to asking questions is to admit to yourself and to your instructor that you don't understand. That requires an admission of ignorance that most of us are reluctant to make. This phenomenon occurs in the classes that we teach at university. What our students forget is – that's why the teacher is there: to teach them. It's irrational not to ask when you don't understand!

The counsel, experts and clients in a patent trial know that the judge does not have their same level of knowledge of the technology. So do the judges. It is however, the "elephant in the room" that is rarely discussed and, even less rarely, properly dealt with.

Learning is often cumulative. If you do not understand the previous point, you may never understand the next point. As soon as you do not understand, you should ask questions.

Good students should be fearless in asking questions when they don't understand. The questions should persist until the matter is understood.

Experts as Good Teachers

Some judges think they can handle anything – so long as it is taught well.

> "In my view, the best expert witnesses are good teachers. They are able to explain their opinion, and why they hold it in simple terms to somebody who has no expertise in the area."[9]

We agree.

It is of paramount importance that the expert be a good teacher.

In order to present matters simply, two things are required:

1. The expert must be very knowledgeable in the area in which he or she is giving testimony. A thorough understanding of the engineering or the science is a necessary prerequisite to be able to simplify it; and

2. The expert must have the skill of making things that are very complex, very easy to understand. This skill is rare. The expert witness will need this skill in order to help answer the judge's questions during trial. Such questions can be avoided by the preparation of a good expert's affidavit with the assistance of counsel having the same skill.

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[9] "Preparing to be an Expert Witness"; Canada Law Book video; 1996.

Unfortunately, not all experts are good teachers. Poor teachers waste the court's time and the client's money. The court has the right to expect good teachers and should demand of poor ones that they do a better job of instructing while testifying.

The Kitchen Table Approach

Conveying knowledge often requires abandoning or minimizing technical terminology or "jargon". Jargon has its place in science and technology as a shorthand method of conveying ideas amongst those who know what the jargon means. In explaining things simply to persons not familiar with the terms, jargon is most often a hindrance to understanding.

Former trial attorney (now U.S. Judge) James Warren said it best when explaining how technical cases should be presented to a jury (the same holds true for judges). He suggested that you imagine yourself at your kitchen table, having a beer on a Saturday afternoon with one of your neighbours who asks you "So tell me, what's that case about that you've been working on?"

Less is More

As discussed above, counsel and experts must not try to teach the judge how to become a scientist or an engineer, nor how to become an expert in the area – that would take many years of education and experience (and sometimes a great deal of mathematics). Instead, the expert must teach the judge what scientists or engineers do. You do not need to learn how to be an architect or carpenter to watch a home renovation program on television to learn how a renovation is done.

Good teachers will also provide the "minimum path" to the destination. If you have to hear a trial involving soil densities, you don't need to learn everything about soils and soil densities. To use an analogy, if the object of the exercise is for us to guide you to the top of the Mount Everest of technical information, you only need to be guided along the easiest path to the top. You don't need to know everything about every rock that makes up the mountain nor do you need to be taken on side paths that do not lead to the top.

Judges should rightfully assume that if an expert is telling the judge something, then it must be important and necessary for them to know to render their decision. Unfortunately, too often, lawyers bulk up their expert affidavits with needless information that tells the Court more than it needs to know thereby filling up the Judge's brain with unnecessary information. Judges have been heard to ask expert witnesses and their counsel "Do I really need to know this? Is this an issue in this case?", expressing their frustration at being "over taught". Any information presented in a classroom or in a courtroom should be subject to a legitimate answer to the question, "Why am I learning this?". Judges should ask this question either to identify unnecessary information or to learn how they are supposed to use information that otherwise seems disconnected from the issues.

Even if good teachers travel along the minimum path, sometimes judges stray off it with questions. The role of the expert witness and counsel is to answer those questions, satisfy the judge that he or she is going off course and guide the judge back onto the necessary path towards the goal.

Pace and Delivery

Good teaching also involves an appropriately paced and organized delivery. If the presentation is systematic, well organized and delivered in a series of relatively simple, properly-paced steps, even the most complex ideas can be readily understood.

Concerning the matter of pace, Mr. Justice Muldoon expressed it well during one of his trials when, after an expert witness was about 30 minutes into his testimony, he asked the witness, "Professor, how long have you been studying in this area?" The expert replied proudly, "About 30 years". Mr. Justice Muldoon said, "Well could you please slow down a bit, I just started on Monday."

In computer jargon, the amount of data being transferred is referred to as "data rate". Mr. Justice Muldoon was simply asking for a more appropriate data rate.

Interest can be contagious

Good teachers are often passionate about their area of study. The thrill of discovery and the enthusiasm that necessarily follows is often contagious, and judges can catch it too!

Science can be fun. Richard Feynman, one of the greatest physicists of the 20th century and one of its best teachers, won the Nobel Prize for Physics in 1965. He accepted the award somewhat reluctantly because he didn't like honours being granted for honours' sake:

> "I don't like honours. I appreciate it for the work that I did, and I know that there's a lot of physicists who use my work. I don't need anything else…. I've already got the prize: the prize is the pleasure of finding the thing out, the kick in the discovery, the observation that other people use it. Those are the real things."[10]

The same can be said for technology. There is pleasure in understanding how things work and a pleasure in making things work that people use. Most scientists and engineers work in their respective fields not because the subject matter is difficult but rather because it is interesting, sometimes challenging and even enjoyable. This joy can often be conveyed to students thereby facilitating the learning experience.

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[10] Feynman quoted in "No Ordinary Genius" by Christopher Sykes; W.W. Norton & Company; New York, London; 1994, p. 82.

The Exchange

What goes on between a teacher and student or between an expert and a judge, can best be described as an exchange. There is an exchange of information. It is most productive when a two way flow occurs. How this exchange occurs, largely depends upon how the student learns.

We all learn in different ways. Some people are visual learners: they learn best by seeing pictures. Some people are aural learners: they learn best by hearing the spoken word. Others like to learn from the history of how things developed. Others aren't interested in the theory – they want to know what can be done with this information – to what situations can they be applied. When we teach in front of a classroom of students, we are not sure what will appeal to the entire class, so, like a baseball pitcher, we throw a variety of pitches, varying their direction and speed.

But how does an expert witness in Court know what kind of learner is the judge?

Without knowing, like the baseball pitches thrown in the classroom, counsel and experts should use every method of teaching and explanation in the hope that the one student – the judge – will understand the message through at least one of the explanations or techniques.

The Power of Demonstrations

Learning occurs most efficiently when more than one of our senses is involved. As teachers, the more senses that we can strike, the more likely a matter will be understood.

"Seeing is believing" applies to scientists, engineers and judges. If a scientific principle that forms the basis of an expert's conclusion can be easily demonstrated in Court, it should be.

The swelling of clay can generate sufficient force to move the foundations of buildings. One colleague convinced a judge of the power of swelling clays through a simple demonstration. He took a glass test tube, filled it with dry clay soil, and then added some water. Of course, nothing happened for about 20 minutes. However, as the clay minerals gradually absorbed the water, they began to swell. Eventually… CRACK! The glass shattered, interrupting the testimony, and convinced the judge that swelling clay minerals could have indeed displaced an entire building.

Where possible, judges should be able to see touch and examine the evidence – perhaps even operate it. As a Chinese saying states:

> I hear, and I forget
> I see, and I remember
> I do, and I understand.

Analogies: From the Familiar to the Unknown

Analogies are another way of facilitating exchanges.

We all learn best when we are learning something that is similar to something that we already understand. If you are familiar with the movement of waves on the water, you can better understand that sound waves are like water waves in the sense that they take time to travel from their source to a listener and that the height of the water wave is analogous to the loudness of the sound wave.

Analogies, like scientific laws, have limits of applicability and should not be stretched.

Do you understand?

As discussed above, it is up to the trial judge to set aside his or her ego and admit that they got lost two pages ago and haven't a clue as to what the expert is now trying to explain. By being silent you are indicating either that you understand or that you are too embarrassed to admit that you do not understand.

Counsel are taught in law school and during their training as junior counsel that it is disrespectful to ask a judge whether he or she understands a point. Judges should either invite counsel to do so or avoid the need by communicating back to counsel and the expert when they "get" a point by saying "So what you're saying is that …" and state their understanding of the point. To not do so requires counsel and the experts to be mindreaders.

A different but equally worrisome scenario for counsel, experts and clients is when a judge has convinced him or herself that he or she understands a point and wants to move to the next point when it is clear to everyone in the courtroom that the judge has misunderstood the point. Counsel must diplomatically advise the judge that counsel believes that the judge does not understand the point. Instead of berating counsel for questioning the court's intelligence, the judge should explain his or her understanding of the point so that counsel's belief will be either confirmed or refuted. If the judge did not "get it", counsel and the expert witness can then go over the point from a different direction.

A tutorial

A technique used by some U.S. judges in patent trials, which could be used in Canada, is the judge's pre-trial scientific or technical tutorial.

The first object of the tutorial is to cover only the basics, in the technical areas not in dispute. The tutorial can go further, if desired, and include an introduction to the technical issues in dispute. The parties usually submit and exchange written statements in advance of the tutorial, where a live presentation is given.[11] Visual

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[11] Matz, Judge A. Howard; "Who Can Understand this Stuff? How American Courts Attempt to Educate Judges and Juries About Science and Technology"; Int'l. Conf. on the Rights of Intellectual Property in Cyberspace; May 2001, p. 14.

presentations can be made either in the form of Powerpoint slides or an educational video produced by the parties separately or cooperatively.[12]

The tutorial can be on or off the record. It is up to the judge. Some judges videotape the tutorial for future reference.

An informal tutorial could provide an environment where the judge is more willing to ask questions and thus more easily understand the issues. A Canadian Federal Court Judge could request such a tutorial be held at a pre-trial conference (and thus off the record) shortly before trial after the expert affidavits have been filed. Such a tutorial would also explain the context of the expert's affidavit before the judge reads it prior to trial and would make that first reading more comprehensible.

5.Concluding Remarks

All will agree that Judges should decide trials based upon the merits of the case rather than the personality of the witnesses. You accepted the job of being a judge knowing that, sooner or later, you may have to deal with questions outside your area of expertise or experience: science and technology.

In the world of scientists, the test of "good science" is relatively simple: Does it survive the scrutiny of the Scientific Method? The same test should be applied by the court in judging science.

We respectfully submit that you should do your best to be an attentive student and to use all of the teaching methods and tools available to you to make learning about the technology as easy as possible. Those tools need to be personally adjusted to your needs and the way you best learn. Only you can decide what you need. You are entitled and, in our view, obliged, to demand those teaching methods and tools from your counsel and expert witnesses.

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[12] Wiley, Judge John Shepard; "Taming Patents: Six Steps for Surviving Scary Patent Cases"; (2003) 50 UCLA L. Rev. 1413 at p. 1418.