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Measure for Measure

It was raining when I went to the Richman building.

“Do you know who last sat where you are now?” the taxi driver said.

“No.”

“Henry Kissinger.”

A receptionist in the lobby told me that if I took the express elevator to the twenty-second floor and then walked down a flight of steps, I would arrive at the floor where the Richmans had their offices. I met young Richman at his office, and together we went into the law firm’s boardroom. I saw an elegant mahogany table surrounded by plush armchairs that could be raised or lowered by pressing a button on the armrest. The outside wall was made of glass, which afforded good views of the Washington Monument and the Supreme Court building. The other walls held framed newspaper articles about huge judgments the law firm had won in litigation involving smoking and asbestos.

After a few minutes Peter Richman and some others entered the room and we all introduced ourselves. Most of those in the entourage were lawyers but it also included Faul, Morris, Milkin, and Phillip Keine, who had apparently changed sides. Just before we got down to business an older man walked slowly through the boardroom. He never said a word, but I recognized that he was Allan Frey, whom I had not seen since the meeting I had attended at the Barbizon Plaza Hotel, almost thirty years earlier. I had heard rumors he was advising plaintiffs’ attorneys concerning the health risks of EMFs, but I had no idea he had bagged such a big client as Peter Richman.

The purpose of the meeting, Richman told me, was to discuss the cell-phone cases but, without missing a beat, he began recounting some of his past cases, pointing to the stories on the walls as he spoke. It wasn’t long before I said, “I know about your successes, but in my opinion they weren’t achieved in the right way.” The room fell silent except for the hum from the vibrating window glass and remained so until he said, “Dr. Marino, how many cases have you tried?”

“None,” I replied.

“Then from where does your knowledge regarding how to try lawsuits come?”

“From an understanding of environmental science,” I said. “Would you like me to tell you how victory should be pursued?”

Before he could respond young Richman said, “Perhaps if I give you some details regarding one of our cases, you could use them as a framework.” I agreed, so he opened a file that was in front of him on the table, and glancing down at it from time to time he said, “Patrick Keogh is a forty-six-year-old brain surgeon who lives and works in Washington. He is married, with four children, including a set of twins; his oldest child is ten years old. About a year after he started using a cell phone he began experiencing headaches and blurred vision. A year later he was diagnosed with brain cancer.”

“To what extent did he use the phone?” I asked.

“About a thousand minutes a month,” he replied.

“Who manufactured the phone?”

“Motorola, a Delaware corporation that has its principal place of business in Illinois and is doing business in Maryland, which is where we got long-arm jurisdiction.”

“So it will be Motorola you sue?” I asked.

“Yes, and they deserve it,” he replied. “I’ll tell you what Motorola did. Its ads deceived users of cell telephones by relaying testimonials from satisfied users, and by manipulating statistics to suggest that cell phones were safe, while downplaying, understating, and not stating their serious health effects. Its promotional literature fraudulently kept relevant information from cell-phone users, and minimized user concern regarding the safety of its cell phones. It began funding a huge research program that it said would prove cell phones were safe. But after the initial studies reported results that supported the opposite conclusion, Motorola discontinued funding the program. It also manipulated the results of testing by others, and concealed evidence that cell-phone radiation was harmful. This information would have caused Keogh and other prudent consumers to stop using cell phones, at least with the antenna held directly against their head. Instead, Keogh and the public were grossly misled and misinformed regarding the biological risks associated with usage of cell telephones precisely because Motorola purposely downplayed, understated, and did not state the health hazards and risks associated with cell phones.”

"I take it that your goal is to make Motorola pay for causing Keogh's cancer," I said, "measure for measure."

He nodded emphatically.

"Then we should think like lawyers and concentrate on the things that matter."

"Like what?" he asked.

"First, Motorola knew that cell-phone EMFs could cause brain cancer."

"Wait. Stop right there," Morris interjected. "The president of Motorola is not stupid. Of course he will say that he did not know that." As Morris said "know" he flicked his two index fingers in the air as if he were adding quotation marks.

"He had a duty to know that cell phones can cause brain cancer because it is true," I said. "So either he knew it or he should have known it, and the distinction is irrelevant in the eyes of the law." All of the lawyers nodded approval, so I proceeded by asking no one in particular, "What should Motorola have done?"

When one of the lawyers said, "Motorola should have made a safe cell phone," I asked him, "What is a safe cell phone?"

"One that does not kill or harm the user," he replied.

"Would you say that a safe automobile should be defined in the same way?"

"No, not exactly," he said.

"Would it be fair to say that the objectionable aspect of Motorola's behavior was not that they made a cell phone that could cause cancer, but rather that they were aware of the possibility and yet failed to inform Keogh?"

When he agreed, I pointed out, "That's what negligence is." Then I asked young Richman, "Is it quite certain that Keogh developed a brain cancer?"

"He didn't undergo five craniotomies, radiation therapy, and chemotherapy for nothing."

"Was he exposed to anything else that causes brain cancer?"

"No, as far as we know."

"There you have it," I said. "All you need to do is prove that cell-phone EMFs probably can cause cancer, and that they probably did cause Keogh's cancer, and Motorola will be forced to pay for its negligence, although the measure he receives may be little comfort to him."

"Well, Dr. Marino," Richman said, "according to my son, you had something to say that could help us. If so, I haven't heard it yet."

Before I could respond, he answered a page and left the room. That was just about enough for me, so I lowered my chair and prepared to leave. Young Richman held me down, however, and respectfully asked me to proceed as we had planned.

“That’s not what your father wants,” I said. “We would all be wasting our time.”

“My father built this law firm,” he said, “but times change and sometimes men do not change with them, even when there is an earthquake.”

“I suppose that a great man can misread the times just as easily as a small man,” I replied, and he said, “Let’s proceed and see where the discussion goes.” He was a hard man to resist. Besides, I knew that the enormous resources of the Richman law firm would give me the best possible chance to show how the law ought to utilize environmental science, which was something that I very much wanted to do. So I raised my chair and began to say what I had gone to the boardroom to say.

“In a toxic-tort lawsuit the plaintiff says to the defendant, ‘You caused my disease,’ and the defendant replies, ‘I did not.’ The MacGuffin can be a drug like Bendectin, a contaminant like dioxin, a medical device like breast implants, or a product side-effect as with cigarettes, powerlines, and cell phones. The common factor in the cases is the question, ‘Did the toxic agent cause what happened to the plaintiff?’”

At this point I paused. I had no pipe to fiddle with, so I just sat still for a few moments to give the impression that something significant would follow. Then I said, “We must first determine what *cause* means at law.” I knew from past experience that if we failed to do so the discussion would inexorably descend into confusion and ambiguity.

“Are you talking about some kind of philosophical definition of cause?” one of the lawyers said.

“Philosophers deal only in opinions, which anyone is free to reject or accept,” I said.

“That’s why we hire experts,” young Richman said. “They deal in facts, and are trained to look at nature and say whether or not there was a cause-and-effect.”

“We are not talking about how to identify a cause-and-effect, but rather about what ‘cause’ *means*. The opinions of experts regarding that meaning are no more binding on the law than are the opinions of philosophers.”

Young Richman frowned as if he were meditating. He must have real-

ized the absurdity of the notion of philosophers or experts mandating to the law what the law meant by “cause,” because he then said, “The people define for themselves, through their law, what ‘cause’ means. *Palsgraf*, for example.”

“*Palsgraf*,” I repeated slowly. “The case says in black letters that ‘cause’ in torts means a particular, foreseeable *but-for* cause of the plaintiff’s harm, namely a but-for cause that for policy reasons the law allows as a basis for assigning liability.”

“I haven’t heard that said explicitly since my first class in torts,” one of the lawyers said. The others nodded in agreement, but the experts looked at each other as if I had spoken in Greek.

“The meaning of ‘cause’ pertinent to what Motorola did,” I said, “is not a philosophical concept or a scientific fact, it is a social construction. The law’s social policy is the primary determinant of what ‘cause’ means. That meaning is only *shaded* by philosophy, and by what scientists mean by that term when they talk to one another.”

“*Palsgraf* is an old case, and it didn’t involve expert testimony,” one of the lawyers pointed out.

“No court ever limited the applicability of *Palsgraf* or its progeny to matters outside science. The rule of that case therefore applies in every kind of tort, including toxic torts.”

After I said that I looked specifically at each of the lawyers in the room, one at a time, waiting to see if anyone would challenge what I had said, but no lawyer spoke. Next, I asked no one in particular, “What would you say is the social policy of the tort law as regards the dangers of commercial products?”

“That when the manufacturer places a product in the stream of commerce that product should be safe,” one of the lawyers responded.

“Yes,” I said, “and I suppose you’ll agree that the way the law implements social policy is to create legal duties.”

No lawyer objected.

“In our situation,” I said, “Motorola had two legal duties: One was to investigate the safety of its cell phones and disclose whether they can cause cancer. If it failed in this duty and the failure caused someone to get cancer, Motorola’s second duty was to pay damages.”

All the lawyers nodded except for one who was staring out the window and probably didn’t hear what I said. “Taking first things first,” I continued, “we must consider whether cell-phone EMFs *can* cause cancer.”

“Which brings us back to the experts,” young Richman said, “because when the matter in issue involves knowledge not normally possessed by the ordinary citizen, only experts are competent to give opinions that can be counted as facts.”

“That is the traditional jumping-off point,” I said. “Let me tell you a story about how this tradition got started.”

“All right,” he said.

“Back when the English common law was first forming, there was a case in which a woman was accused of having given birth to a sheep. Some priests said the event proved that the devil was at work in the world, but others said that God would not have permitted such a thing, and that therefore the purported event never really happened. The king appointed a committee of scholars to investigate the matter, and they ultimately concluded that the woman could not have given birth to a sheep. The people were afraid to ask the learned men how they knew that, and the king did not do so because he wanted to end the controversy as soon as possible. From then on, whenever experts gave opinions, no one presumed to ask the experts how they had come by their knowledge of the causes of what takes place in the world.

“Of course from time to time there were those who suspected that what experts said was no more reliable than what priests said. More typically, however, the people believed what either priests or experts said, and for the same reason.”

“You think this attitude continued even into the twentieth century?” young Richman asked.

“Not only continued but grew stronger, because the success of technology was taken to mean that experts *always* knew what they were talking about.”

“Then?”

“We reached a turning point. The faith that people had in the word of authority figures began to erode.”

“What was the turning point?”

“I can only give my opinion,” I said.

“Please do,” he answered.

“When President Eisenhower lied about the U2 spy flights over Russia. People thought, ‘If you can’t trust Ike who can you trust?’ and their willingness to believe anyone in authority began to decrease. It wasn’t long

before this attitude was transferred to experts. Distrust increased with each lie that the experts told, even though some lies were arguably helpful in certain respects.”

“For example?”

“They said that the high cancer rates in the soldiers who witnessed the hydrogen bomb tests weren’t caused by the radiation, and that the convenience of x-raying children to insure that their shoes fit properly outweighed any risk that the children might get cancer. They told black men at Tuskegee that there was no treatment for their syphilis, and they said that DDT didn’t hurt the environment. They said that thalidomide, Agent Orange, and cigarettes were safe products. They told an infinite number of smaller lies that you never hear about because they were never publicized, as for example that artificial ligaments made from carbon fibers are unsafe.”

“What has changed as a result of the lies?” he asked.

“The breaking of the chain of inference by which an advanced academic degree had been taken to imply expertise which, in turn, had been taken as a sign of knowledge. This break ended the time of the law’s uncritical faith in experts.”

“What broke the chain?” he asked.

“The Supreme Court,” I said. “In *Daubert* it rejected the antediluvian practice of blindly trusting experts and laid down three requirements for identifying knowledge.”

“Which were?” young Richman asked.

“First, that there is a method for producing knowledge. Second, that the method is a commonplace. Third, that the expert followed the method.”

“Do you mean the scientific method?” young Richman asked.

“Are you asking me what I suppose the Court meant by ‘method?’”

“Yes,” he said.

“Some particular form of thinking is needed to connect evidence with knowledge, because evidence doesn’t speak for itself. The thinking that does this job is what I suppose the Court meant by ‘method.’ I wouldn’t call that method the ‘scientific method’ because the term has become a cliché.”

“People seem to agree on what it means,” one of the lawyers said.

“Only because a person who hears the phrase assumes he knows what was meant. That’s how its vagueness is perpetuated.”

“What’s the way out of that problem?” asked one of the lawyers.

“To say directly what the method is, not simply call it ‘scientific.’”

I replied.

He asked me to say what I thought the method was, but before I could do so another lawyer piped up and said, "It is a specialized form of thinking used only by scientists."

"I suppose that you know what form of reasoning is used by lawyers," I said, "but how would you know what form is used by scientists?"

"I don't know," he said.

"Then how would you know that the reasoning they use is specialized?" I said.

"All right," he said, "you tell me, is it?"

"The thinking that scientists do is not unique to scientists. It is the same as the thinking of laymen. So we should use the same name we use when we describe how laymen think."

"What name?" young Richman said.

"'Common sense' is as good as any," I said.

"Then why do we need experts?" he asked.

"Because the evidence on which the common-sense inferences of scientists are based is of a special kind," I replied.

"If science is just common sense, why do experts cost so much?" one of the lawyers said, much to the amusement of all the other lawyers except young Richman.

"Scientists are specialists in what they do," I said, "like boat-builders or lawyers. Everyone is a specialist in something, and when he is consulted in that capacity he is entitled to be paid, and his opinions deserve respect."

"What's the special evidence you mentioned?" he asked.

"One kind consists of the laws of physics, which is where all our scientific deductions come from. Another kind consists of careful observations and measurements. Bona fide experts usually find these kinds of evidence clear and direct, so they rarely result in disputes."

"But disputes do occur," Morris interjected. "Remember cold fusion."

"What's another kind of evidence?" young Richman said.

"A work product containing observations and measurements commingled with opinions of the author that invest meaning in the data. These products are typically called 'studies,' but they may also be called 'analyses,' 'reports,' 'judgments,' 'results,' 'assessments,' 'reviews,' 'decisions,' 'determinations,' or 'findings.' They are the primary means by which scientists exchange with each other what they regard as knowledge. Studies are also

the portals for communication between scientists and laymen. Unfortunately, studies can easily be manipulated.”

“Can you expand on that?” young Richman asked.

“Like the ingredients in bread, the ingredients in studies disappear. Laymen can judge opinions but not data, so companies that despise environmental science make the kind of bread that best nourishes their business. And they always do it quickly.”

“Why quickly?” he said.

“They want their point of view publicized as early as possible because they know that the tradition of reverence for experts has conditioned the layman’s mind to be like the jaws of a crocodile – the muscles that close it are strong but those that open it are weak. That’s why Motorola hired Mays Swicord; I would be more delicate were I in court, but here I am among friends.”

“What does he do for Motorola?” young Richman asked.

“Arranges for the publication of allegorical studies whose moral dovetails with Motorola’s interests. Motorola is like the company that had been making food additives for a long time. One day someone asked, ‘Is your additive safe?’ The company president realized that the question could alarm the public who might expect that there was an answer, so he hired experts who produced data showing that, as far as they could tell, consumption of the additive had no effect on growth in mice. The experts then opined in their report that the food additive was safe for human consumption, which vindicated the status quo. That’s what Swicord’s studies are designed to do, and which is possible because all biomedical studies consist of commingled data and opinion.”

“I don’t know what you’re talking about,” said one of the lawyers. “Experts are supposed to tell us what the data means.”

“I disagree. You pay a boat-builder for his expertise in building boats,” I said, “you don’t ask him about the purpose or meaning of the boat. Similarly, you hire a lawyer for his expertise in winning cases, not because you want him to find the truth. All lawyers know that’s not their jobs.”

“We do?” the lawyer said.

“Suppose you represented a stone quarry,” I said, “that was sued because its operations were too loud, and you hired an expert who made measurements of the sound level and agreed with the complainants. What would you do?”

"I'd fire that expert and hire another one," he said.

When the laughter stopped I said, "When the putative side-effects of a commercial product are under consideration, the strangest thing in the world would be for all the experts to agree on the meaning of the pertinent studies."

"So are you saying the question whether EMFs *can cause* cancer is to be resolved by a jury when the opinions of experts are in conflict?" one of the other lawyers asked.

"I think so," I said, "but let's not jump the gun. Common sense often fails when people attach different meanings to the same words. We must first ask each kind of expert to tell us what he understands to be the meaning of 'can cause.'"

Faul said, "For me the meaning derives from experiments. I won't attempt a grand definition but I'll give you an example. Suppose I am investigating whether cell-phone EMFs can cause changes in the amount of neurotransmitters in the brain. I would form two groups of rats, only one of which would be exposed to the EMFs. After a predetermined time period I would kill the rats and measure the neurotransmitter levels in each brain. The range of the values in each of the two groups will overlap, so I would use the t test to compare the averages and assess the odds that the two averages were really different. If the odds were greater than about 20:1, I would say that the EMF exposure caused a difference in the average level of brain neurotransmitters."

"Suppose the odds were less than 20:1," I asked.

"Then I would conclude that the EMF had no effect on the neurotransmitters," he replied.

"It's possible that an effect occurs only after a different predetermined time," I said.

"Yes."

"Or with a stronger or weaker EMF?"

"Certainly."

"Or with an EMF of a different frequency?"

"Obviously."

"Or if you used a different animal species?"

"Clearly."

"You wouldn't propose that the experiment be done with human beings, would you?" I asked.

“Of course not,” he replied.

“Suppose that the odds were greater than 20:1,” I said. “How could you say whether or not cell-phone EMFs can cause brain cancer in human beings?”

“I would form an opinion based on the number, quality, and kind of all relevant animal studies.”

“What number, quality, and kind would you require?”

“I can’t say for sure, but I usually know it when I see it.”

“We’ve heard from a biologist,” I said, “now let us hear from a physicist.” I looked at Dr. Stein and said, “Please tell us what ‘can cause’ means to you.”

He stood up, said, “Cause means force, therefore ‘can cause’ means *can force*,” and sat down.

From the expressions on their faces, the lawyers in the room found that explanation unedifying, so I asked, “Would you kindly explain in slightly more detail?”

“Maxwell’s equations govern the interaction of EMFs and tissue. So ‘can cause’ means that the effect is predicted by these equations.” He swiped his hands against one another and sat down.

One of the lawyers said, “When an expert says ‘can cause’ perhaps he should be required to wear a colored hat, green for the biological meaning and red if he uses the term like a physicist.”

“We might need a third color, perhaps yellow, because we have not yet heard from Dr. Keine.” As the old man rose, his bones creaked like a set of castanets. When he was standing as tall as he could he said, “Suppose that everyone in Maryland who got cancer filled out a questionnaire and disclosed every possible fact about his life, including the extent of his usage of cell phones. To explore whether cell phones can cause cancer, I would find a person who was a doppelganger for each person who got cancer, except that the persons chosen would not have cancer. I would then compute the percentage of cellphone users among the doppelgangers. If it were less than the percentage in the cancer group, I would say that cell phones were associated with cancer, and perhaps caused it.”

“What would it take for you to drop the ‘perhaps?’” I asked.

“At least fifteen studies in all of which there was a higher percentage of cancer in the cell-phone group.”

“Would fourteen studies be enough?”

“No.”

“Dr. Keine,” I said, “have you ever seen an instance where it was possible to identify a doppelganger?”

“Not really,” he said. “Everybody is different.”

As he sat down, his bones played another tune.

“If different kinds of scientists disagree over what ‘can cause’ means,” young Richman said, “how can we expect a jury to sort out the mess?”

“There are indeed problems,” I said. “I can think of two. But they don’t include a lack of intelligence or incisiveness on the part of juries. Given half a chance, they will find the best truth.”

“I wish I had your confidence,” he said.

“I think you do,” I said, “at least you act as if you do.”

“What do you mean?”

“You already agreed,” I said, “that any liability Motorola might have stems not from the fact that cell-phone EMFs cause cancer, but rather from Motorola’s failure to warn Keogh of that possibility.”

“Yes.”

“That failure to warn is called negligence, which is nothing more than acting unreasonably,” I said.

“Yes.”

“In a particular set of circumstances, what is unreasonable is determined by the consensus of laymen,” I said.

“Yes.”

“You wouldn’t say that was hopeless.”

“No,” he said. “Juries do it all the time. That’s our system. They evaluate the credibility of witnesses, and make judgments regarding what is reasonable.”

“It’s the same with expert witnesses,” I said, “so even a jury of high school graduates can tell which experts make the most sense, assuming, of course, that the lawyers are competent.”

“Yes,” he said. “The longer I practice law the more I think that they should teach the art of cross-examination in law schools. But you mentioned two problems. What are they?”

“People expect too much certainty and too much honesty in scientific matters,” I said. “This mythic background can be overcome only by hard work and proper preparation by the plaintiff’s lawyer. A top lawyer conducts a proper cross-examination, a lazy lawyer doesn’t make the effort.”

“Let’s assume that we have proved that cell-phone EMFs can cause

cancer,” young Richman said. “How do you decide whether Keogh’s cancer was caused by EMFs?”

“First I would prove that he had cancer. Then I would show how much EMF exposure he had and how long, and that he had no substantial exposure to other known cancer-causing agents. The conclusion follows that the cancer was probably caused by the EMFs.”

“Why couldn’t it have been caused by something else?” he asked.

“It could,” I replied. “No one can ever be certain. But look at the facts. Keogh has cancer, and he experienced extensive EMF exposure. Now, something caused his cancer. Something made it happen. Something such that, if you took it away, you would take away the cancer. We know EMFs can cause cancer. It’s possible something else that we don’t know about caused Keogh’s cancer, but that’s unlikely because the other things that we know can cause cancer weren’t experienced by Keogh. The choice, therefore, must be made between the two alternatives. Either we say that the EMF caused the cancer, or that it was caused by some unknown or unsuspected agent. It’s more likely that EMFs were responsible, because we know that they can cause cancer and that they were extensively present in the case.”

Just as I finished speaking Peter Richman returned to the boardroom and took the vacant seat at the head of the table. After apologizing perfunctorily for his absence he said, “Dr. Marino, would you summarize what you have told my colleagues?”

“I said that the key question was whether cell-phone EMFs caused Keogh’s cancer, by which I meant that they were a but-for cause. If so, Motorola will have to pay up. Experts who truly know from laboratory studies that EMFs can cause cancer are needed. The surmise that EMFs caused Keogh’s cancer is more or less obvious, given his extensive EMF exposure and the absence of other putative causes. Victory will depend on your skill in showing the jury that Ryan’s experts are mistaken.”

Richman laughed for what seemed a long time and then said, “Experts are never mistaken; they just disagree with one another. If Ryan presents an expert from Harvard, I present one from Yale. An expert from Yale is not like one from LSU.”

“No,” I said, “Yale is more famous.”

“Juries don’t understand experts,” he said, “and when juries guess I win at least half the time. As you can see,” he said as he pointed to the walls, “my approach has enabled me to provide well for my family.”

“If I could make you see what you have become,” I said, “you would kill yourself.”

“What!?”

“Your aim is to make Motorola pay whether or not cell-phone EMFs can really cause cancer. It’s a loathsome goal, and by chasing it you have weakened society.”

Richman slammed his left hand on the boardroom table, said, “Meeting over!” and left the room. I never saw him again.

I lowered my chair and waited for everyone to leave, which they did, except for young Richman who, like me, remained seated and silent. My inability to connect with Peter Richman was a giant blow to me. I had engaged in honest dialogue and meant everything I said for the reasons I gave. But my sincerity was not returned, and I was not able to draw him into a discussion and convince him of the error of his ways. He was rich, so money would not have been a barrier to winning the case. The victory would have been earned in the right way, and would therefore have begun the process of establishing environmental science as the evidentiary frame of reference for scientifically related issues. With my knowledge and his money we could have done this, and then gone on to other similar cases. Together we would have been like Eisenhower and Montgomery invading Europe to free it from tyranny. What a legacy we could have left to our children!

Young Richman and I went up to his office on the twenty-second floor, and as we waited there for the limousine that would take me to the airport we had our last conversation. He said he would press forward as best he could to try and prove that the EMFs from Motorola’s cell phone had caused Keogh’s brain cancer.

On the way home from Washington, while my failure to team up with the Richmans was still vivid in my mind, I sat next to a professor from the University of Rochester on the airplane.

“I know someone from your university,” I said. “Morton Miller. I haven’t seen him in many years. Do you know him?”

“Yes indeed,” he replied. “Morton is doing quite well. He was recently notified by NIH that his grant will be renewed again. He has been continuously funded by NIH for the last 28 years.”