

Mr. Wizard

Notes on the Life and Work of Leonard Reiffel

by James E. Thompson

Presented before a meeting of the Chicago Literary Club

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Do you remember where you were on October 5, 2009? I know where I was and I'm sure many of you were there too. It was the evening of the Chicago Literary Club's opening meeting that year. As is our custom for the that meeting, we'd borrowed from the gentle ladies of the Fortnightly Club their handsome residence. You know the scene. The anteroom was filling. Name tags stuck precariously to our lapels. Drink tickets were sold and torn from a spool of carnival coupons. I remember Don Wroblewski sitting behind a metal cash box taking bills and making slow and careful change. Conversations were in groups of two, three, and four. Pleasantries were spoken everywhere. As one walked through the pre-dinner gathering, familiar characters were seen again holding court and equally familiar characters gave their smiling attention. You see, we are a club of energetic talkers and accommodating listeners.

Throughout the summer the board had worked the plans for the coming season. All the preparation business had been taken care of – papers were scheduled, yearbooks had been mailed, and thanks to the alertness of Frank Lackner, a special matter was attended to. We'd learned that three of our members would be celebrating their 50th anniversary of Club membership. They were Anthony Zummer, Addis Osborne and Leonard Reiffel. We'd ordered wood plaques with a brass plate for each of them. It had been hoped we could present these in person and with some ceremony, but among those honorees only Tony had been seen at the occasional meeting. Reiffel hadn't been around for a long time and Mr. Osborne was living someplace in Michigan. It was decided we'd just put plaques in the mail sometime during the season.

It also happened that on that night I was presiding at my first meeting as President of the Club. I remember being nervously chatty with everyone I talked to. I was like a politician, sliding from one group to another, sputtering bromides. Just before we were called to dinner I invited myself into one more conversation consisting of three distinguished but amiable looking fellows. One of the men, a tall, thin-faced stranger said quietly and modestly, "You know, I think I may be your longest running member." He reached out and shook my hand, "Len Reiffel," he said. "You're Len Reiffel?" I said. "You're Len Reiffel!" The second time I almost shouted it. I felt like I'd just been dealt the needed card in a poker hand. Reiffel took a half step back and looked at me showing a face of confused amusement. It was a look I would come to know well in the coming years.

"Look, Len," I said. "We have a plaque for you. It's a nice one, brass and wood. Fifty years is a big deal. We don't have it here tonight but please come to the meeting next week. We'll do it then." "Ok, I will," he said. "I'll bring my wife." "Absolutely," I said, "bring your wife. We need to do this right."

The next Monday, at our first regular meeting, I kept an eye out for Len. I carried his plaque in a brown envelope under my arm. When the dinner bell rang and he wasn't there I thought that he was going to be a no-show. Then, just as all were seated, Len stepped out of the hallway followed by a tall, handsome woman, elegant in jacket and slacks. One had two immediate impressions of her – first, she was or had at some time been a model and second,

she appeared to be several years his junior. I greeted them. He introduced me to Nancy and we grabbed a small empty table. I started peppering him with questions. I wanted to have something to say when a few minutes from now I presented his plaque. I was also kicking myself hard for not looking up some of his history. I asked him what the Club was like when he joined in 1959. I asked him what he'd done in his career. He said he'd been an engineer and a physicist. "Now days I guess I'm mostly an inventor," he said. He spoke in a rich voice at an easy pace and you got the sense he could have been an announcer of some sort. He brought Nancy easily into the conversation although she needed no help. She was as skilled as he at small talk. They made you feel immediately comfortable. And part of that was the clear connection between them, the regard they had for one another and the playful quips they made at their own and the other's expense. They had the grace of those who invite you to see into their lives.

After a while he said to me, "I know that you were in the advertising business. I'm working on something now that might be of interest to advertisers. It's a new idea and I think it could be big." But then, as if catching himself, he said, "I can't talk about it yet. I'm still working on the patent disclosure. I'll get in touch when it's ready." When dinner was finished and the pie came he turned to Nancy and told her about the tradition of the bottomless pie and Daniel Burnham's connection to the pie and to the Cliff Dwellers. She squeezed his hand and said gently, "I know honey, this is not my first time here."

So began my acquaintance with Leonard Reiffel. I had no idea at the time that he would become a business partner and a friend. Len, the inventor, the engineer, the physicist, the

writer, the lecturer, the NASA scientist, was without question the most accomplished of any friend I've ever had. It's my belief that Len Reiffel was a man who must be, on examination of those accomplishments, among the top echelon on the life roster of this venerable club. It's for those reasons that I'd like to tell you a little bit about my friend, our friend. It's fortunate there is a good public record because he was always reluctant to talk about himself. Over the six or so years of our connection I managed to pull out of him some detail around his various projects. But, I hasten to say that this paper could not have happened without the great help of two very remarkable women in his life: Len's wife of 49 years, Nancy, and Romaine Rickoff, who worked as Len's personal assistant for over sixty years.

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On the afternoon of September 30, 1927, Tom Zachery, a left hander for the Washington Senators, was on the mound at Yankee Stadium pitching to Babe Ruth. The count was 1-1. Zachery threw a low fastball that Ruth launched like a rocket over the right field wall for his record breaking 60th home run. ¹ That same day, in Chicago, Len Reiffel was born. Leonard Reiffel, a man who was to become a true rocket scientist, got launched in the best way possible, he was born in America and he was raised in the Midwest by two loving, smart and interesting parents. He grew up at 3508 W. Irving Park Road and went to Roosevelt High School. Carl and Sophie Reiffel watched their kid, a neighborhood kid, an only child, grow up; a normal Chicago boy, with normal boy interests that included a passion for tinkering at a very young age with chemistry and electricity at a home workbench. He made friends easily and gave and got

respect the way that boys do who know how to get along. He had that quality that goes a long way with most folks, an easy-going normalcy. But there was one thing about him that didn't fall in the normal range. Len was extraordinarily bright. He didn't use his brain to show superiority, he didn't preen, he didn't overtop. He used his terrific mind to be at ease with whatever had to be done. It allowed him to excel in school with little effort and that gave him time to be with his imagination, to think and to create the kind of mental environment for himself that would in time make him a genuine renaissance man.

His dad, Carl, was a silversmith with great skill and artistry in his hands. Carl's company, Reiffel and Husted,² was successful making and selling home goods like candlestick holders and silver bowls. Carl, like his son, was also a man of ideas. One of those ideas was the slide saxophone, an unusual instrument that he created and patented. It allowed the player to express a continuous range of tones between notes.

Len's mom, Sophie, was a public-school teacher with a reputation for being tough and no nonsense. Maybe you remember teachers like that, the type that suffered no fools? But she cared intensely for doing her job well and getting kids started right. The Reiffel's were a tight, happy threesome. All involved with their personal tasks and also involved with each other. Dinners at home each night and occasionally a visit to the Buffalo for ice cream, just a few blocks away. It was the textbook little family, but one that took a huge hit one day in 1943 when Carl Reiffel died suddenly -- a heart attack. Len was just 15 and the death of his dad broke his heart.³ The loss brought him and Sophie even closer together. And if anything, it made

them both even more focused on their work. Three years later Len got his BS in Electrical Engineering from Armor Institute, now the Illinois Institute of Technology. Sophie, for her part, became a school principal, later a Superintendent and eventually a highly regarded District head in the Chicago Public School system.

Len took his MS at age 20 and continued at Armor for his PhD in 1953. Toward that end he was one of a small number of graduate students chosen to work with Enrico Fermi at the University of Chicago.⁴ This gave him some of his early direct experience with atomic energy and its applications. The assignment led to some unusual field work, flying in the nose of a B29 analyzing the content of clouds from test detonations in the Pacific. He was part of a team in 1952 that tested the first hydrogen bomb.⁵ His work caught the attention of the powers at the Armor Research Institute. They were not about to let him to get away and it was here that his skills at both science and management of people and projects were further revealed. By the time he was 29 he was in charge of the team of more than one hundred scientists and running the world's first commercial nuclear reactor at IIT, just down the street.

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Do you remember where you were on October 4, 1957? Probably not, but you may remember the headlines that day. The USSR announced their launch of the first artificial space satellite. They had put a 184-pound aluminum sphere, the size of a beach ball, in orbit around

the Earth. It travelled at 18,000 miles per hour. Sputnik crossed over the US several times a day, visible to the naked eye some claimed. ⁶

It gave off a menacing buzzing sound that was recorded and broadcast on news reports throughout the country. The Soviet Union had beat us into space. The size of the Russian payload was, to the public, a stunning surprise. Our own planned satellite was to be a puny three-and-a-half-pound grapefruit on top of a Vanguard rocket. And it was still just on the drawing board. However, the military and scientific community was not discomfited. Our intelligence knew all along, where we stood in space technology versus the Soviets. But Sputnik, shook the public consciousness. Remember, this was the height of the cold war. Russia's nuclear capability and a very scary Nikita Khrushchev induced fear throughout the nation. In grade-school we practiced duck-and-cover exercises and if your family took a Sunday ride on Lake Shore Drive you could not miss the view of Nike Ajax missiles on the lakefront, part of an installation of more than 600 missiles in the Chicago area that were intended to shoot down Soviet bombers coming over the North Pole. The idea of Soviet space superiority was sobering. Our scientific, educational and military preparedness was immediately questioned in the press and became a matter of real concern. Military and political leaders felt a need to restore public confidence. Sometime in 1958, Len Reiffel was approached by Major General Charles McCorkle, head of the Air Force Special Weapons Center in Albuquerque, New Mexico. McCorkle charged Reiffel to lead a top-secret matter known simply as Project A 119. The purpose, to explode an atomic bomb on the moon. The assignment came to Len dressed up as a scientific inquiry the military was making into certain seismic and radiological effects that would provide a richer understanding of the lunar surface and its composition. Len knew from the beginning it was

nothing but a publicity stunt. What the Air Force really wanted was to create a mushroom cloud you could see from Earth.

One afternoon a few years back, Len and I were working at his house. He and I had partnered to create a commercial application for one of his most recent patents.⁷ As we worked over our business plan I briefly changed the subject. I told him that I'd stumbled onto an obscure article in the *Guardian* about something called Project A 119 and that his name was all over it. "Oh, you heard about that?" he said. "The military wanted to show that we could do it. It was a really bad idea." "It's so fantastic," I said. "Could you actually have done something like that back in the fifties?" "Sure, it would be like falling off a log," he said. "But it was really a bad idea. It would have been monumentally stupid."⁸

Sometime later, I read one of the project reports sent to General McCorkle over Len's signature.⁹ After the clear and well-crafted abstract the following 290 pages were dense and recondite analytics. The math was dizzying. It's a document of imposing density and complexity – the application of atomic physics, optics, chemistry, trajectories, radioactivity, dust clouds, and biology combine to speculate what happens if you explode an atomic bomb on the moon. This paper alone was evidence of the depth and breadth of Reiffel's scientific capabilities. But, read it and bleeding through the testimony of hard science -- alternatively certain and circumspect – is a stage whisper, in Len's voice... 'This is nuts. This should never be done.'

“Why didn’t anyone hear about it,” I asked. “No one should have ever known about it,” he said. “It was classified. It was top secret, at least until one of my research assistants, a graduate student, leaked it on a job application.” Len paused and I think I sensed a little bit of a sneer when he said the name, Carl Sagan. “Wait, Carl Sagan was your assistant?” “Yes, and he was a real self-promoter. He was supposed to calculate the shape and density of dust clouds created by the blast. He didn’t get very far. His math was not very good. But what he did do is violate national security by ever talking about it. He let go of top secret information.” Not word of A119 came out from Len or dozens of the scientists involved, for three decades. The leak was discovered in 1990. Sagan’s biography told that he’d used that moon-bomb experience in support of a fellowship appointment at the University of California at Berkeley. As everyone knows, Sagan went on to become a hugely popular interpreter of the cosmos for the common man. But one of Sagan’s early teachers was not one of those fawning fans.¹⁰

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How about October 1, 1961? Know where you were then? Neither do I, but that happens to be the day that Roger Maris broke the home run record of sixty by smacking just one more – Maris hit 61 in ‘61. That feat has little to do with Len’s story but it provides a nice symmetry with the Babe Ruth thing. Len Reiffel had just turned 34 the day before. His eleven-year first marriage is over. He’s a divorcee with two sons, Evan and David. He’s a respectful ex-husband but, more so, a devoted father.¹¹

If you remember back to Chicago's exciting night life in the early sixties, it was Rush Street that was at the center. It pulled in loads of striving, well-heeled young professionals. The near north was at the top of its game -- Mr. Kelly's, Catfish Row, The Store -- Butch Maguire's had just opened its doors. The area was known simply as The Street. If you asked a friend if he was going to the Street tonight he knew exactly what you meant. Rush Street was a beacon that attracted every sort of young, upward mobile character -- bankers, lawyers, ad people, athletes, and now and then a nuclear physicist. Len, now single himself, was living in the near north and from time to time after a long day at the cyclotron would drop into a bar named Larry's. On one particular night, he was with fellow scientist, Dr. Fred Rest. Len spotted a very attractive young woman sitting with a girlfriend across the room. You would of course expect a research scientist to have discernment and keen observation. Len did not disappoint. He poked his pal and pointed toward Nancy and said, "That one's different." When the young lady walked over to the juke box Len got up and stood beside her, silently, as she scanned the selections. After a while he said, "Hi, my name is Len." It wasn't the kind of line that would be likely to grab a girl's attention and certainly wouldn't stir any kind of chemical reaction. A more aggressive and experienced Street guy would have said, 'Let me buy you a drink and tell you how I 'm going to blow up the moon.' That was hardly Len's style. But persistence was his style and he kept dropping into Larry's in hopes of seeing her again. The bartender there told Nancy, "The Doctor has been asking about you again."

He finally got a date for dinner and that started a six-year courtship that needed to accommodate the schedules of two serious professionals. Nancy was teaching English in

Scotland and Venezuela, and Len was spending more time in Washington DC, Houston and Florida as he was being coaxed into a new opportunity with the space program. Only after it was settled that Len would not be required to relocate, that he could continue to stay in Chicago -- after all, he had two sons, and now Nancy – he took the job as part of NASA's Lunar Landing program.

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It was in that year, 1961, that Len presented his first paper at this Club. He gave ten papers ¹² here and to read through them again is to peer into a mind and spirit that touched so many interests – he wrote about his work with other brilliant scientists; how he commandeered a ship in the South Pacific as part of a hydrogen bomb test; he wrote about bringing nuclear power to South Korea; sending a monkey into space in 1951; a consulting visit to Chernobyl; his brief career in making sausage; his hobby of attending auctions. Read his papers again and you get a real sense of the man, and through his writing, you see how easy it was to like him. And my, the man could write. He tells a story and it moves along at a sprightly pace and then slows and grinds into amazing detail from time to time as warranted. His published novel, *The Contaminant*, ¹³ is an exquisitely developed page turner. It involves Len's fantasized biochemical attack on citizens in the Soviet Union by a rogue element in the US government – the carcinogenic poisoning leads to the brink of nuclear war. If one reads in the genre of international spy thrillers they might become amazed at the detail and esoteric knowledge that the writers must have sweated to acquire to make their yarns have substance and credibility.

The technical knowledge of biochemical weapons, the effects on the body, the notion of how one might employ nefarious systems for the delivery of lethal toxins – the stuff that fills the narrative of *The Contaminant* -- is the kind of knowledge Len carried in his head and retrieved with the ease others of us do our own addresses and phone numbers. All he had to do was plot the action. At the time he was writing that novel, Nancy was working on redecorating some of the rooms in their house on Deming Place. But her plans for repainting the living room walls had to wait. Len decided the old white walls would be a perfect surface on which to create and flow the action of his intricately plotted novel. All four walls were filled with his pencil-marked notes on character, motivation, connections, who knew what and who didn't. Action and dialogue were inscribed in boxes; triangles, circles, arrows and connectors surrounded him and when he wanted to create he'd sit in his swivel chair in the middle of the room and think what came next.

As to the papers he presented to the Club, I'm sorry to say I was not present for any of them but I'm sure a few of you were there. I wish I'd been here to hear him speak with his natural ease and whimsy. I'd love to hear him tell his personal stories. His first-person accounts are filled with sharp observation, lightheartedness, self-deprecation and many are redolent with the love and closeness of his long marriage to Nancy. It would be great to hear him, but I also wish I'd been here to hear the introduction the whomever then-president made of this amazingly accomplished man.

If it were me introducing him I'd want to draw on his CV which runs to 45 tightly typed pages. It starts very simply with his BS from IIT in 1947 and MS a year later, both degrees in Electrical Engineering. It then notes his PhD in Physics and Electrical Engineering. Ok, I'm really impressed already. But that's just the first half page. There follows a prodigious list of Honors which include his 1954 selection as one of Chicago's Six Top Young Men of the Year by the Chicago Junior Chamber of Commerce. And because he was still a young man in 1961 they gave him the same honor again. Three times he won the Industrial Research 100 Award for developing one of the most outstanding technical products of the year. More on that in a minute. In 1968, he won broadcasting's most prestigious award, The Peabody, for outstanding coverage of Science and Technology. More coming on that too. And if I was introducing Len tonight I guess I would also mention that he's a member of The IIT Hall of Fame -- one of just about 50 people in the school's history. Len's name sits alongside names like Robert Galvin, Herbert A. Simon, Lowell Thomas, S.I. Hayakawa and Mies Van Der Rohe.

Then there's his professional experience that includes three stints as Director of Physics Research at IIT, the holder of more than one hundred patents, Technical Director of Manned Space Flight Experiments at NASA ¹⁴ and then Deputy Director of the Apollo Lunar Landing Program where he was responsible for the selection of alternative landing sites on the moon. He might be a little more equivocal about it, scientists tend to be equivocal, but I'd tell you it was Len and his team who found and signed off on the spot upon the moon where Neal Armstrong first put down his foot.

Len's appreciation of and involvement in this club is well documented. But if some of our membership noticed he was missing occasionally on a Monday night it might be he was presenting at some symposium in Venice, Brussels, Warsaw, Belgrade or Paris. If you saw Len in one of those places you'd have heard him talking about solid state physics, the ionization of gasses, programming nuclear reactors, or the soft gamma component of cosmic rays. Or he might have been at one of his committee appointments with the U.S. Atomic Energy Commission or the National Academy of Sciences or he might have been busy with the joint Congressional Committee on Atomic Energy.

It's heady stuff, big brain stuff. But there are lots of big brains in science and it seems sometimes the more specialized and arcane the knowledge the more insular the practitioners of that knowledge can be. Being able to make the complex simple, or to bring understanding out of the abstruse, that's a whole other skill, one that's perhaps even more rare than the big brain. Not only was Len a world class scientist he had the ability to explain what he knew. During the late 60's, in his busy times with NASA, he made time for speaking at colleges, to women's clubs, men's clubs, corporate meetings, town halls, chambers of commerce, trade associations, more than seventy lectures which fall into a CV category he called the Public Understanding of Science. Len was a big draw. Not just because of his resume and power title at NASA, but because he filled audiences with clear and memorable understanding of stuff they never knew. Brilliant, plain spoken, avuncular, he never used notes or props other than to poke at the air once in a while with his pipe stem. He captivated them with what he knew and could easily explain about rockets, satellites and space travel.

His appetite for spreading knowledge about science and the world was, in those days, just getting started. As we worked together, I learned, only by dragging it out of his modesty, that he'd also had a long running radio show called *Science and You*. It was a series of short segments about space, war, medicine and innovation that played on CBS radio. Some of the more intriguing titles: *Chicken Eggs in Orbit*; *Why the Greeks Reclined*; and *It's Embarrassing to Lose an H Bomb*. Most of these radio segments were accompanied by his newspaper column that was nationally syndicated. And this was not just a now and then thing. Between 1966 and 1975 he created more than 1500 of these radio shows and newspaper articles. In 1966, he also produced and starred in a children's show for CBS TV in Chicago called *Backyard Safari* in which he pointed out the wonders of nature and science that are right under all of our noses. One day when he was explaining the program I said, "Jeez, you were like Mr. Wizard." Of course, I was referring to Don Herbert who had a very popular, long running kids science show on Saturday mornings. Len chuckled, "Yeah, he was pretty good too."

It was in doing that kids TV show that Len had one of those amazing creative moments. It was like when a grain of sand gets inside the shell of an oyster – one of those times when a minor irritation turns into a huge pearl. The way Len told it, he was working on *Backyard Safari*, "I got tired of saying, 'Now, over there in the corner of the picture and a little bit to the left you can see that little thing...'" Out of that frustration he went work on the problem and soon developed a video screen that would trace the path of a stylus by way of an electrical impulse and reproduce the line onto the picture that was broadcast to a television. No longer would he

have to say look over in the corner. Now he could point to what was on the screen; he could draw an arrow, circle the thing, label it, write notes about it right on the screen. He had just come up with his most celebrated creation. He struggled with what to name the invention. His mother, Sophie, said, "Isn't it obvious? You illustrate on a television. It's a *Telestrator*." Len used the Telestrator on his own program narrations and after perfecting and patenting it, he brought it to CBS Chicago weatherman John Coughlin and showed him how he could introduce drawings of clouds and raindrops and pressure fronts into his nightly TV weather forecast. Coughlin loved it and pretty soon sportscaster and ex Chicago Bears Johnny Morris asked Len to try it on a football broadcast. After a few successful uses in regional TV games, CBS took it national and re-named Len's Telestrator, *The CBS Chalkboard*. Sportscaster John Madden debuted Len's invention in 1982 on Super Bowl XVI. Len was in the broadcast booth that afternoon in California showing the large, boisterous, arm-swinging, excitable Madden how to use the thing. "He almost knocked me out of the booth with his gestures," Len said. "I nearly went over the rail into the crowd. Later, as Madden was getting the hang of it, I looked away for a moment and when I turned back to him he was stirring his coffee with the electronic stylus. Glad I had a backup." The Telestrator is widely recognized as having brought a whole new dimension and level of interest to sports broadcasting. It won Reiffel a television Emmy. The device now has been supplanted by all sorts of new technology and video pyrotechnics. But his was the invention that opened the door to all sorts of television notation including electronic first down markers on football broadcasts and tracers showing the path of booming drives on the PGA tour. And as some evidence that sometimes things are right with the world, Len's baby is still

most famously known by its original name, not the CBS Chalkboard, but the Telestrator, just as Sophie named it.

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So what's a guy to do after he's finished testing some of the first nuclear bombs, and after he's convinced the Air Force not to use one of them to blow up the moon; after he's played an integral part in putting the first man on that moon; after writing a couple of novels and toured the country as a lecturer and toured the world as a presenter at symposia involving the world's greatest technical minds; and after being a radio and TV science commentator; and then creating a product that opens a whole new era in television graphics? What do you do then? Well, if you're Len Reiffel you just keep going. The next thing you do is start a company, create a business and take it public. In the early 80's Len used the Telestartor technology to start Interand,¹⁵ a company focusing on interactive communications. At Interand he created another breakthrough, the communication of video still images and graphic capabilities over phone lines that would allow people to collaborate on projects in real time. This was really leading-edge stuff at the time. The Interand Interactive Teleconferencing System pre-dated the advent of video-conferencing. Other applications of that technology had enough "Gee-Wiz" about it that it was featured in the early days at Walt Disney's EPCOT.¹⁶ His creations were among the first exposures to a world of interactive communications and smart connectivity. But, after some early success, Interand began to struggle. As with many founder-led companies the genius of invention does not always guarantee successful management of the business.

Interand grew to employ more than 120 people in the mid-eighties. Len's first connection and attention was to the technology and its capabilities. The company attracted new capital and new partners. Critical decisions about strategic planning, selling and customer management was left to others who were not clearly aligned.¹⁷ There was an absence of focus on which customers to target and what their real needs were. Growth slowed, the resources were being drained and Interand closed in 1992. Another of his companies, Exelar,¹⁸ had less commercial ambition.

In the late 1990's Len was treated for prostate cancer. During his course of radiation therapy, it occurred to him that using a superconducting magnet could better concentrate the radiation and allow higher doses to the tumor while limiting damage to the surrounding tissue. Exelar won a million-dollar grant and he worked for several years on it with researchers and surgeons at Rush University Hospital. Certain technology limitations at the time caused the project to be discontinued. But, it's another example of how Reiffel never stopped thinking about how things might work better.

Earlier, I mentioned Chernobyl. The single word is one of those relatively few words that has the power to evoke a shudder peculiar to when those dreadful things which can happen, do happen. That disaster in the spring of 1986 and the lingering devastation and the insufficient efforts of the Russian government caused the republics of Ukraine and Belarus to try to get US attention to their plight. In 1990, the two governments invited Reiffel to visit the site and consult on what he'd seen. He experienced Chernobyl at both a macro and micro level and what he saw was reported and re-reported in his essay in the *Los Angeles Times*.¹⁹ Even more

personally and poignantly, his Club paper entitled *Zona*, gave much more of his personal experience of being guided through the site near the buried ruins of Reactor #4. He and Nancy also visited the surrounding countryside. They met with an old woman who had been evacuated but had returned to the so called Forbidden Zone. “My home was here,” she told Len, “I came back to die.” That same day a poor farmer tugged at Len’s sleeve. He explained through a translator that he and his wife had almost nothing to eat except one recently butchered pig. The farmer asked Len to use his Geiger counter to tell him if was it safe to eat this pig. Len took some measurements. He already knew the extent to which the farmer and his wife had been exposed to deadly radiation and that eating this pig would make little difference to their fate. Looking thoughtfully at the readings on his Geiger counter and then up at the farmer, Len told the farmer that if was him, he’d eat the pig. The farmer’s face lit up in a smile and he grabbed Len’s shoulders in thanks for answer he been hoping to hear.

When we talk about people of serious accomplishment, people who have put up a lot of points on life’s scoreboard, it’s easy to ignore the everyday, human side. Sometimes overlooking the personal lives of high achievers accrues to the benefit of the subject. Not in Len’s case. He made room in his personal life for dabbling – he was a photographer, a collector of antiques, from a suit of armor that still stands guard at his home office to an antique car, a 1917 Roamer; he got deeply involved in authenticating a painting by Manet;²⁰ and some years back, on a whim, he and Nancy bought a neighborhood bar, and part-time comedy club called, The Roxy. Why? Because they loved the place and it was about to go out of business – they

kept it going another five years. Not only could he write imaginatively, he loved to draw. He left behind stacks of whimsical sketches lampooning the NASA bureaucracy as well as original drawings for the amazing decorative elements that were added to their home over the years. But among all his drawings the ones I found most touching were those that illustrated his light-hearted love notes to Nancy. After a long courtship, they finally got married, and they liked getting married so much they did it in several different places. And they renewed all those vows throughout the years. Consequently, he and Nancy celebrated every plausible anniversary and for most of them Len created a sketch and a sentiment, often on the spot, at a restaurant on a napkin. Their marriage was a flirtation that lasted 49 years.

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Leonard Reiffel died on April 15, 2017. It was extraordinary luck for me to spend time with him during the last six years of his life. In the time that we were together I saw in him what a lifetime of others before me had seen, a man, not just brilliant and productive, but kind, lighthearted and deeply engaged. He was simply a gem of a fellow. Throughout his life Len Reiffel was the smartest guy in most rooms. And though he could impress you with stories about his accomplishments, he talked about himself only reluctantly. He had that disarming humility that was the model for good men in the middle of the last century.

Take that element of humility, then add he was a scientist, an engineer, a teacher, a writer, an inventor – It brings to mind one of those polymath, fictional heroes, the kind you see

in the movies whose skill and wisdom is a force for good in the universe. Len Reiffel was something of a wizard -- Our Mr. Wizard.

Notes

¹ Like many small details from long ago, the count on Ruth before he hit the home run is variously misremembered. Most accounts say it was one ball, one strike. Others report with certainty it was 2-1. Most odd is that the pitcher himself, Tom Zachery, in a letter written many years later just before his death, said it was a 3-2 pitch. One imagines that might be an intentional distortion. A 3-2 count would have given Zachery a little more cover for having served up a home run ball. There is now a YouTube video that shows that Ruth hit what was most likely the third pitch into the bleachers in right. I'll stand by the 1-1 count.

² At the start of World War I, Reiffel and Husted thrived as a large-scale producer of bugles for the army. Later, the company produced cornets and trumpets in different keys. Len's first job, at age eleven, was to grind flat a metal decorative ring that attached to the handle of the horns. The boring repetition was maddening and Len needed no further convincing that he was cut out to work with his mind. Carl tried to market his slide saxophone through the influential Chicago musical retailer Lyon and Healey. But Lyon and Healey said they would allow him to manufacture the instrument for them but required that he sign over any patents to them without charge. Maybe it was that experience which contributed to Len's life-long obsession with patents and the protection. The slide saxophone is now a collector's item, ingenious but rarely played.

³ Len revered his dad. Carl's death hit him very hard. Still in high school, he would talk long walks in the evening for miles down Irving Park Road all the way to the lake to be alone with his thoughts. As years went on and great advances in diagnosis and prevention were coming quickly, he was continuously conscious that it was all a little too late for his dad.

⁴ Len told the story of his first encounter with Fermi, in an elevator in a laboratory basement at the University of Chicago. Fermi got on carrying a heavy stack of leaded bricks. Still a graduate student and eager to be involved in Fermi's work, Len said, excitedly, "Can I help you?" Fermi looked at him blankly and said, "Yes, push the button." Len's assignment at the Institute for Nuclear Studies at UC was to design a cyclotron for Fermi's work there. Len, into his very late years, continued in some awe of Fermi, talking about his kindness, brilliance and the thrill of auditing his courses in those days.

⁵ In 1962, Len's was again conducting analyses of our own nuclear tests as well as the Soviets'. Riding in numerous military aircraft flown throughout the South Pacific, he captured particles to learn the principal material components and yield of Soviet devices that were being detonated in the region. He also monitored U.S. atomic tests of high altitude devices that were part of Operation Fishbowl. One particular device, Starfish, was a 1.4 megaton blast at the extraordinary altitude of 250 miles. Starfish caused an electromagnetic pulse, far larger than expected. An aurora of charged particles flowed instantly along the earth's magnetic field lit up the night sky, bright green, from Hawaii to New Zealand and knocked out significant power and communication in Honolulu, 900 miles away. Len talked about that green sky that he experienced and spoke with great concern about the pulse effect of high altitude blasts in a war that could absolutely cripple our power and communications grids.

⁶ While Sputnik itself had been a highly polished sphere, its small size made it hardly visible to the naked eye. What most watchers actually saw was the much larger 26-meter core stage of the R-7 rocket tumbling end over end across the sky.

⁷ Len had been working on a project he called Attentive Environments. His patent involved a system of flash photography that could read the varying positions of a reflective signaling device at long distances. His technology allowed him to instantly capture and analyze individual opinions in a mass audience in a live setting. Our business idea was to engage stadium crowds in games or polled opinions during sports events. We called it Crowd Metrix. We eagerly knocked on doors of college and professional sports teams, TV networks, newspapers, signage companies, event planners -- even the Goodyear Blimp was showing interest. We presented an imaginative idea along with persuasive arguments of how it could drive fan attendance, audience attention and make team owners gobs of extra money. My job was to write the pitch. Len's job was to explain the technology and to demonstrate we had some credentialed brainpower. It was my dropping of Len's name that got us into many meetings in which sports executives sat almost star-struck that they were in the room with the guy who'd invented the Telestrator. We had a great idea, and a great story. What we didn't have is timing. It was 2011. Smart phones were just getting started to become really, really smart. Touchscreens, broadband, long battery life, photography, not to mention Twitter, brought an unimagined capability that revolutionized crowd communication. In the parlance of start-up business, we couldn't get traction. Two years earlier? Eighteen months sooner? In might have been different.

⁸ Since this project became known to the public in 2000, any number of articles have been written, many in a disbelieving and angry tone that blames any and all who were involved. This CNN piece https://www.youtube.com/watch?v=AU5zFjnyd_A offers a somewhat less scandalized perspective, but most interesting, it shows Len's own recollections in which he provides a much more calm and sober consideration of the project.

⁹ The now declassified document <https://nsarchive2.gwu.edu/NSAEBB/NSAEBB479/docs/EBB-Moon02.pdf> provides an exhaustive analysis the many complex aspects of the project including where the explosion should occur to provide the best view from the earth, as well as the irreparable damage it would do to certain aspects of future scientific study of the moon.

¹⁰ There had been debate and controversy over whether Sagan intentionally breached security. In this letter to Nature Magazine Len gives his first-hand account. <http://www.nature.com/articles/35011148>

¹¹ Len and his first wife, Judith, were divorced in 1961. Their two sons Evan and David were 5 and 6 at the time. Len was intent on being a continuing influence in their lives. Although the boys lived with their mother in the early years, Len used his visitation rights, Wednesday nights and Sundays, to stay connected. Len and Judith were not on the best terms so Len often employed his assistant, Romaine "Ronnie" Rickoff, to make the twice-a-week transfers. Most Sunday dinners, the boys recall, were with Grandma Sophie, who perhaps gave them a second perspective on maternal affection. David reported that Sophie would say, fondly, "Just remember, before he was your father he was my son." Len was not your average divorced father. His work, obviously, was especially demanding, nonetheless, on some occasions he would fly in from Houston or Cape Canaveral just to make those dinner meetings. His particular occupation also provided opportunities to get a boy's attention and to stimulate their learning. He would take them to the lab at IITRI (Illinois Institute of Technology Research Institute)

where they were amused by working with the mechanical arms that were used to handle radioactive and other dangerous materials, as well as with lasers and barometric chambers. A few years later, Len's business travels to European cities would sometimes turn into vacations that give them exposure beyond that of a typical Chicago teenager. And not many fathers could, as Len did, make a call back home and put their sons on with a couple of Apollo astronauts. As in so many families, their relationships had ups and downs over the years, but conversations I had with Evan and David reflect great respect and affection for their father and the knowledge that their dad was an extraordinary individual.

12 Len's ten papers:

Power and Time (1961) Len's experiences during his consultancy in South Korea and their impractical obsession with nuclear energy to power their country.

Project X (1964) A series of vignettes, including sending a monkey into space, being bit by a French National Champion Chow dog in Paris, losing a prized fishing lure, and the UN's role in space, atomic testing and war

G Like NG (1969) Len's experiences in Pago Pago while trying to chase down some high altitude atomic radiation in a commandeered leaky fishing boat and avoiding a native Chieftain's gift of a wife.

That Which I Should Have Done I Did Not Do (1977) Discussion of a dozen or more of Len's start-up attempts based on ingenious ideas which, sadly, went nowhere, including tech enabled treasure hunting in Haiti, and opening a restaurant where customers cook their own food.

Future Tense (1981) An exploration of the tremendous growth in the of the rate of change, by varying orders of magnitude, in the four decades leading up to the paper's date. Len continues with speculation on life in the coming decades, astounding notions, some of which today have already been superseded.

Will of Iron Flesh of Stone (1984) A light-hearted telling of Len and Nancy's initiation and then addiction to auctions. He observes the various "subspecies" of bidding types, tells of famous auctions and his own near-miss.

The Roamer (1991) Another discussion of the auctions' temptations to acquisition. This one centers on Len and Nancy's winning bid and their ownership of a 1917 Roamer automobile.

Zona (1995) Len's trip with Nancy to visit the ruins at Chernobyl at the request of the Ukraine and Byelorussian governments so he might observe and report his findings to the West.

Turn Down an Empty Glass (1999) Len was the closing night speaker on the occasion of the Club's 125th Anniversary. He used the theme of anniversaries to give a look at the status of life and science at various points in the Club's own history and counterpointed those with insightful projections into the coming years leading up to the Club's 200th.

An Eye for Scenes Unseen (2002) A sketch of the work of Len's friend and colleague, Walter McCrone, a world famous forensic scientist. The paper focuses on McCrone's debunking of purported

historical treasures, paintings claimed to be Picasso's, a Leonardo, as well an ancient map that would have shown Vikings to have found the "new world" many years before Columbus, had not the map been proven by McCrone to have been created in 1930. McCrone and Reiffel collaborated on an investigation to indeed authenticate a Manet portrait (see note 20). And McCrone was most famous (and in some quarters vilified) for having proven the Shroud of Turin to be a fake.

¹³ *The Contaminant* was published by Random House in 1978, it may have sold as many as two hundred thousand copies and was also put out in paperback edition. Evan Reiffel recalls that it was twice optioned by Universal Pictures to make a feature film, although nothing, which is often the case, came of that. The book can still be found on Amazon. Len wrote a second novel, *Krizis*, unpublished, dealing with similar subject matter in which Arab terrorists take over five nuclear reactors in Ukraine as hostage for the delivery of five nuclear bombs to use against Israel. It's no coincidence that these novels deal with the threats of nuclear and biological contamination in the hands of evil actors. Len learned early of the inherit dangers of materials and methods created by science in his own lifetime. He saw first-hand their power and lethality during bomb testing in the 50's and how governments cannot always be trusted with the care of such materials: the stewardship at Chernobyl, the idea that in a race with the Soviets we, or they, would consider militarizing the moon. David Reiffel observed that his father was intensely aware of the seriousness of scientific knowledge and the responsibility we have for its human consequences.

¹⁴ Len held down two jobs at NASA in the late 60's. He was responsible for the lunar landing team and particularly the selection of sites where the first landing would occur. He was also in charge of the lunar sciences team that was tasked with creating all sample gathering and what experimental packages would be left on the moon. These two responsibilities dovetailed importantly. Not only was a safe landing critical but, so too, the character of the surface needed be conducive to the critical science work.

¹⁵ Interand was born out of an earlier start-up, Industrial Dynamics, a business Len started with Sophie when she retired from the Chicago Public Schools. They sold educational materials, mostly instructional videos. Len was the tech and Sophie, who had tremendous contacts in the educational community, was the rainmaker. Profits from Industrial Dynamics seeded Interand which proliferated the basic Telestartor technology into applications for the military, business, education and other organizational forms that require real time collaboration across geographies. New capital was raised in an IPO and the company had a valuation of \$50 million in the mid 1980's. One of the investors, a large Japanese trading company, Marubeni, took a 7% stake. Another investor, Nippon Telephone and Telegraph, had grand plans for the products in Japan

¹⁶ Len served for several years as a consultant to EPCOT in its early days. He contributed many ideas and systems to the Image Works, Kodak Pavilion. At EPCOT, the Telestrator became known as The Magic Palette on which a million visitors used it to make electronic paintings. Not so exciting in today's world, but this was 1983. It was magic.

¹⁷ These partners may have been central to Interand's undoing. There was constant pressure to make tweaks and revisions to Interand's offering in order to satisfy potential customers. Much of this pressure came from overseas and ironically, communications and dissimilar business cultures exacerbated the problem.

¹⁸ The project received \$1 million in seed funding. In test applications at Rush the technology was shown to allow the delivery of 25 to 40% greater doses of radiation without added injury to the surrounding healthy tissue. Unfortunately, the size of the superconducting magnet required to direct effective doses made it impractical in the clinical situation. Exelar was unable to get underwriting to support the necessary clinical trials.

¹⁹ Len's essay, published in the LA Times, painted a picture of the Soviet's extreme incompetence in the handling of atomic power which led to the event and continued, only somewhat mitigated, in their handling of the affected population. http://articles.latimes.com/1991-02-17/opinion/op-2089_1_chernobyl-accident

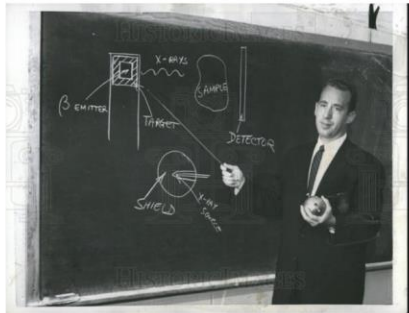
²⁰ Len's next-door neighbor, one Andrew Brainerd, was in possession of a painting which he maintained was an Edouard Manet copy of the Velasquez's painting *Infante Marguerite*. Brainerd had been in a decades long dispute with art historians on its authenticity. Len became involved along with his friend and colleague Walter McCrone, a forensic scientist to do chemical analyses presented in support of Brainerd's claim. Len did his typical deep dive into the project to include meetings in Saint Petersburg, Russia with experts at the Hermitage. McCrone, who was the subject of Len's Club paper, *An Eye for Scenes Unseen*, was a principal in the debunking of the Shroud of Turin. Len Reiffel's hobbies and dabbling were hardly pedestrian.



At a press conference at NASA with visiting Russian scientists



Taking the Lunar Rover for a test drive



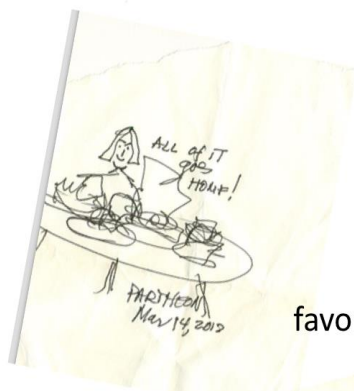
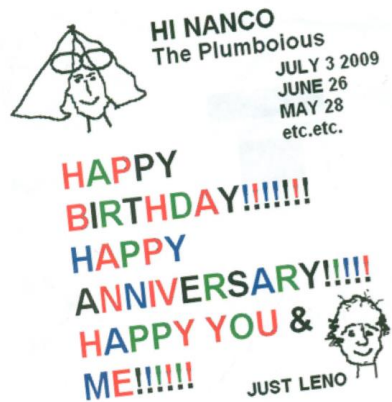
Head of the nuclear reactor program at IIT



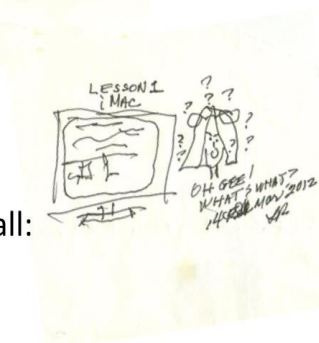
Len and Nancy entering a hot zone at Chernobyl

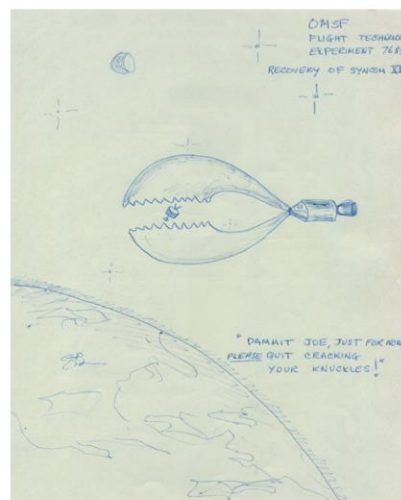
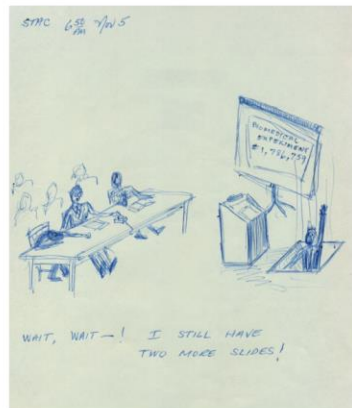
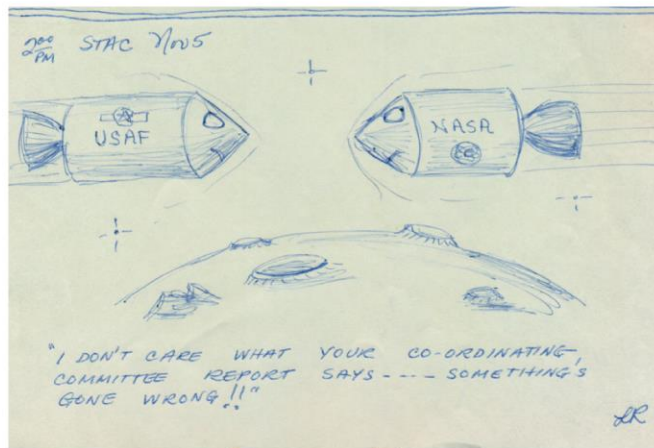


With the Interand teleconferencing system on a project for the Army



Len's favorite project of all:
Nancy





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