

Votes, Nukes, Games And Rocket Science

My first exposure to politics, elections, and nuclear science began in 1954 while standing just outside our living room in Pennsylvania. I heard the voice of my sainted mother.

“That son of a bitch. That damned son of a bitch.”

I froze – then realized she was staring at the radio. She couldn’t see me lurking in the hall. And I hadn’t heard my name. Even so I got out of there - distance is safety when you are prone to venture, and have a mother with a limited patience for ventures.

That evening my father returned home from Philadelphia where he managed the General Electric switchgear division. He came in the garage door, handed me the evening paper, and started for his study where I would lie on the floor reading the funny pages while he would light up and go through the mail.

Mother stopped us in our tracks.

“Bob, I have to talk with you. I don’t know what to do.”

My father appeared startled, but he said “Of course dear.”

He turned into the living room where she was but, as I started to follow, mother sent me into Dad’s study with the paper.

But I could hear – at least a little. Mother began:

“Bob, that son of a bitch McCarthy is a facist. He’s making all kinds of accusations about people being disloyal and trying to overthrow the government and he’s costing honest people their jobs.”

“He is pretty outrageous, isn’t he?”

“Bob, he’s more than outrageous. He’s a threat to decency. He’s already cost Oppenheimer his job – Oppenheimer was the only one in that whole bomb crowd that had any sense.”

“Oppenheimer lost his job?”

“Yes, they took away his security clearance for arguing against developing nuclear weapons. All because he said they were immoral. You know him, Bob. Didn’t you meet him with your father once?”

“Yes, I did. But Janie - there’s not much we can do. We don’t live in Wisconsin any more so we can’t vote against or influence McCarthy.”

“Yes, but what about your father? He’s still at the University and he has some influence. Didn’t he correspond with Roosevelt about the depression and those income maintenance ideas. He’s pretty political isn’t he! He ought to be concerned about this.”

“Janie – Dad’s a scientist. His work with Edison and Steinmetz is what Oppenheimer was interested in. It was about power generation and transmission. Dad probably sides with Teller anyway, since Teller says the nuclear weapon is just a side-show to nuclear power. That’s how it works ... one idea leads to another and we move forward. The massive amounts of heat from the bomb would make any power generation scientist green with envy.”

“But isn’t all that bomb stuff secret, classified?”

“Well, yes, but that doesn’t matter. If we know someone has done something, then any relatively smart scientist can figure out how they did it. It’s like a game. I may not know how they did it, but if I know they did do it, then I know it can be figured out. All classification does is keep someone from copying it right away. None of this is rocket science – adapting the reaction to power generation.”

“Bob, that’s terrifying. You mean anyone can do it?”

Their voices dropped and I couldn’t hear more. But some of the excitement continued later that year when three men about the age of my father showed up at our front door. I sort of recognized them, and they me; but my father took them back into his study and closed the door. I thought I could sit on the stairs just outside and hear what was going on ... but they weren’t speaking loudly enough.

After they left, my father went into the kitchen. He said, “Janie, I’m going to do it.”

“Well, that’s wonderful, Bob. Noticing me lurking, she said, “Tommy, your father is going to run for office – township auditor.”

Well, that meant nothing to me, so my parents went on to explain about voting and elections. I listened and thought, interesting but so what.

Later that summer, it got interesting again. One of the men came by and pushed a large piece of paper through the door slot. I picked it up, and unfolded it. There was my father’s name listed in one column across a line from the word Auditor. I took it straight to my mother. She said, “Oh, the sample ballot.” Then fell silent staring at it. Then she muttered “that idiot, that fool” and stuffed it in her pocket. She stared at me and said, “Just wait ‘til your father gets home.”

Now that was not a good sign. She saved that line for when I was deeply in jeopardy, so I made a rapid retreat - even though feeling no guilt.

But curiosity led me to return to lurking when my father came home. She met him at the door.

“What on earth were you thinking? How could you?”

“What?”

“Look at this, look at this ballot. How could you? You’re listed as a Republican! You’re not a Republican That’s what that idiot McCarthy is. Do you want to be associated with him?”

“Janie! What are you talking about? I just agreed to run. I didn’t think to ask about what party, just about the job. You know I’m not political. I’m just a scientist.”

“Don’t give me that rocket scientist stuff. You call them right now and tell them to move your name.”

“Tommy, go feed the dogs.” The look on their faces said, once again, that retreat was the preferable option. I went.

Seven years later some of these themes began to be reprised. I had an important meeting at the beginning of my junior year in college.

The Dean leaned back in his swivel chair. That precipitated another cascade of Camel ashes down the front of his blue serge suit. The Dean was massive – almost as wide as he was tall ... always wore blue serge, white shirt, and tie. He was balding and a halo of white hair that seemed to arise from both sides and the back of his head - a sort of widely scattered halo. And no one knew for sure whether the stuff on his shoulders and lapels was dry scalp or cigarette ashes – the Camel was ever present.

In any case, to an anxious student, he seemed particularly massive and not a figure of amusement. He swiveled slightly, harrumphed again. I thought to lean back and appear casual but poised to flee is contra-indicated for casual.

The mountain spoke. “Well Mr. Bennett, you didn’t make, what we here call, the home team. I sought to spare your good mother your presence at home this year.”

Ever articulate, as all Hamilton students with a public speaking requirement are, I responded “Huh.”

“Mr. Bennett, Hamilton College only sent ten of your lot home for their junior year as under-achievers – you sir were number eleven.” He paused, now staring intently.

“Your record last year was abysmal, one C and five D’s. Abysmal, sir! You might easily have qualified. What was it – what did you do – aside from not much?”

He paused. I guess, again, for effect. I knew that was a question. But my brain and mouth were dry, empty like any desert - without water or hope.

“Never mind – I know. It was the beer and women right? That and the hockey! Am I not correct sir?”

I knew flight was out, but I yearned to be somewhere else.

“Here’s how it worked. We took a look at your College Boards, at your freshman record. And we decided that those astronomical college-board scores were an anomaly, that your freshman year was a fluke, and that you are nowhere near as intelligent as we had thought when we admitted you.”

“And obviously, if that is correct, then we could hardly call you an underachiever. Are you following this? If you are naturally stupid, then your record last year could not be characterized as underachievement, could it?”

I managed a brilliant, “Ah, yes sir.” I had a feeling the sentence was coming.

He leaned back, coughed a little and stared. I began to break a sweat – or at least noticed that I was.

Then he leaned forward.

“On the other hand, I feel the need to commend you; perhaps shake your hand. I cannot understand how you did this. I have never had a man get this many hours of D and not fail a single hour. It is astonishing sir, astonishing. What am I to do with you?”

I finally leaned back – there was a sliver of hope here I thought.

“You have a choice – you can drop the beer and women/hockey thing and continue with your 3/2 plan – finish this year here at Hamilton and continue on for your masters at MIT or Cal Tech; assuming this last year hasn’t turned them off you completely. Or you can keep the beer women thing going and change majors to complete a BA here in two years. Tell me about this summer thing you are doing.”

At least I was still alive. And now I needed to speak. “Well, sir. Last summer I worked in a storeroom at Atlas Chemical Research Labs but one of the chemists noticed I was pretty good with numbers so, at the end of the summer, a man named Jim Weaver suggested that, next summer, I work as a technician with an operations research group he was forming.”

The Dean smiled: “Ah yes, he said. I’ve heard of that ... sort of applied science... multiple disciplines. Hmm - you better try economics. It’s not the rocket science you want-a-be physicists think you can do. But, if you can think a little like a physicist, the way economics is headed, you might find it more suitable to your apparently more limited intelligence. Listen carefully! I also know you’re aiming at grad school to avoid getting drafted. And, while you and I both know law school is a year longer than an MBA, you’re not suited for the law. If you can’t do the physics work you’ll sink in law school – too much heavy lifting – not your style. Besides, Mr. Bennett, it is always better to be someone who hires lawyers rather than be one.”

Relief ... a semi-honorable retreat was possible.

I finished my junior year with a much better academic record, a once in a while place on the ice, and a girl-friend. I began my new summer job.

Operations Research is the use of higher level mathematics to refine and optimize complex decisions in practically any field. It emerged as a discipline in World War II where it was used to analyze the sort of logistical, communications, and deployment problems found in a global war. Its difference from simply applied mathematics was its inclusion of experts from other disciplines. The classic story told by the OR faculty at Wharton concerned a team trying minimize wait times at a bank of elevators. There were complaints about how slow they were and the building manager and tenants wanted a solution. So the team assembled mountains of data about wait times, the cost of new controls, and even the cost of putting in another elevator.

On the appointed day, the team immediately began working through all the materials with their slide rules (some of you may remember them) and calculators looking for an optimum solution at minimum cost. Suddenly a psychologist, who had come along just to observe team functioning, asked if he might make a suggestion. And he went on to say, “Two panels about six feet high on each floor between each of the three elevators ought to solve the problem at quite low cost – mirror glass. Then, when the women are waiting they can check their hair and makeup, and the men can watch them do it. No one will notice they’re waiting.”

But I digress. The operations research group that I was joining had become CROND (an acronym for Computer Research on Non-Partisan Districting). It was a small research organization the aforementioned Jim Weaver had founded with funding from the Ford Foundation through the National Municipal League. Its role was working as amicus curiae for the Federal District Court, and the Supreme Court, during the famous “one man, one vote” cases over whether representative districts ought always to be nearly equal in population. Prior to these cases, some Congressmen represented a few thousand citizens and others represented tens of thousands. The courts ultimately held that rough equality of representation was a constitutional right. Interestingly, the majority opinion did not deal with “gerrymandering” – the drawing of districts to favor particular parties. The opinion referred to this as “the political thicket” and felt it was not within the court’s purview under an interpretation of the separation of powers. In any case, CROND’s purpose was to develop a computer system to more easily

redistrict, and /or test redistricting plans for the important criteria, population equality. However, while the courts ultimately declined to review “gerrymandering,” they had, prior to the final opinion felt that compactness and contiguity were good proxies for communities of interest.

The scientists at CROND had developed a tool, based on the physical concept of moment of inertia, to accumulate census enumeration tracts into districts in such a way that they met these three criteria. The moment of inertia application is fairly straightforward. In simple terms, moment of inertia is a measure of balance. Anyone who has played with a teeter-totter is familiar with the idea. The lighter weighted person sits a longer distance from the center than the heavier to achieve balance. The CROND concept used the census of an enumeration district as its weight; and the enumeration districts distance from the center of the representative district, to calculate the moment of inertia of a given census tract for a given legislative center. The idea was to minimize the calculated moments. In other words keep the pieces closer together.

My job had several parts: map the given political entity on a two-dimensional XY grid; estimate and record the centers of the enumeration districts on that grid from census data; prepare “touch” tables that checked whether these tracts were contiguous; prepare the data for input to the computer system; and finally map the results. After we had a result, we then began the tedious process of looking for trade-offs, among the enumeration districts, that would improve minimizing both population differences and moment of inertia, thus increasing compactness. While we could use computers for some of the calculations, the problem of translating map coordinates in Latitude and Longitude to the XY grid required massive hand computations.

Then came a breakthrough - from rocket science, no less. It led to my first real encounter with Top Secret Classified information. Jim Weaver called me into his office from the map room and said,

“Your work is about to get easier. Judge Wright (one of the judges hearing the cases) and I had dinner last night. I described the difficulty we were having with the latitude and longitude translations, and he recalled some of his work during Korea with the CIA. Anyway he called Senator Williams who called Senator Javits; and they pulled some strings. Anyway we are promised the translation codes for this from the CIA. Call this number and ask for...” he paused. “James Smith.” He smirked, “Welcome to the land of smoke and mirrors.”

So I made the call. And a voice said, “And you are?” I gave my name, explained who had asked me to call, and then, thinking it would enhance my efforts, dropped the names of Judge Wright, Senators Williams, and Senator Javits. After all, I was pretty impressed. It got me, “Who you trying to impress kid?”

The voice then began a fairly exhaustive personal cross examination of me. After quite a while he said, “All right, Thomas.” This was a step up from “kid.” “Here’s what you do. Thursday, you will drive your Corvaire south towards Washington on I-95. When you cross the Potomac

take Route 1 South. Just after you pass through Groveton you will see a diner on the left called “Hybla Valley Diner”. Drive by at a steady speed, slow ... go three tenths of a mile past the diner and pull into the gas station on the right, turn around, and come back to the diner. Turn right into the parking lot and park with your taillights to the street. Go into the diner and take a booth. Sit facing the door in a seat by the window, and wait.

“What if there aren’t any parking places?”

“Don’t worry. That’s why we’re meeting you at 1:30 – be on time.”

“Well, how will I know you?”

“We know you. Make sure you wear that Hamilton College athletic jacket, and no hat. We know lots about you.”

“What if?”click

So, south I went – a little anxious, so I left a little early, and there was a silver lining. On the way back I could swing into Baltimore and visit my love of the moment, Mimi, a junior at Berkeley.

I followed my instructions carefully, my anxiety rising as I crossed the Potomac onto Route 1. Then, there was the diner. It had a sign up high and a parking lot full of smaller cars and pickup trucks. But, there was a large black sedan sitting on the side of the road just opposite the entrance to the diner; large, black, with a very long radio antenna.

“Wow, undercover, huh?”

But I continued the three tenths of the mile, pulled into a parking area and swung around, and headed back towards the diner. My anxiety rose when I saw there were no spaces in the row that faced the road. And then, just as I got to the driveway, a car started up and pulled out of one of the spots. I wondered.

I parked, got out, locked the car and went into the diner. It was about half empty and the waitress waved me back towards the booths along the street side. I sat as instructed, peeked out of the corner of my eye at the sedan and waited. After a minute the waitress came back and asked if I wanted water or a soda. Whoops, I hadn’t thought of this but I knew I should act normally. I started to say water and then thought – not very manly undercover stuff. “How about a cup of coffee?” I chirped.

The waitress brought the coffee and, after what seemed a very long time, someone got out of the passenger side of the sedan. It was a warm, early summer afternoon but the person was dressed in a fedora pulled down over his eyes, and a long brown overcoat. Oh I thought very stealthy!

The person entered the diner, moved his head about as if to look around, and then walked towards me, fedora still in place. I started to raise my hand but his face suddenly snapped away from me and he walked right past me. I froze. I took it from the head jerk that I was not to appear to know him, but if I looked around now.... Suddenly, with no sound at all, he slid into the seat.

I started to speak, and he stared sharply again. Then he said "What was your father's middle name?" I didn't remember being asked that before, but I said "Moore. Robert Moore Bennett."

His hand slid into his overcoat and came out with a magazine with an envelope just peeking out of it. He put them down in front of him and covered them with his forearm as he leaned forward.

"Listen to me very carefully Thomas. You are to return to Wilmington exactly the way you came. You will not deviate from that path at all Do you understand? Don't speak, just nod."

I nodded.

"The codes and equations are in this envelope. Do you understand?"

Again I nodded.

"Lean forward and put both your hands on the table in front of you. Then do not move until I have left the diner."

I leaned forward. He leaned forward to stand and smooth as silk slipped the magazine under my hands. And he walked out.

I thought now what? I owe the waitress. Ah, ha a flash of insight. I dropped a couple of ones on the table and waved goodbye. She seemed to be laughing at something. I got into my car and put the envelope in my glove compartment. I had a momentary thought of the lovely Mimi, but the sedan was still sitting there.

I started up, turned right in the direction I had come and the black sedan U-turned right behind me and then dropped back. It stayed right there until just before the Interstate when it turned off. I got on the Interstate, thinking free at last. Thoughts of Mimi crept back into my mind – but disappeared after only a few miles when I noticed a Maryland state trooper about three cars back. After a few miles he seemed to drop further back so my paranoia eased and I thought no more of it until I reached Delaware where there was a state trooper sitting just in front of the "Welcome to Delaware" sign.

I went straight to the office and into to Jim's. He looked at me, smiled, and said, "Sit down." He lit his pipe, leaned back, and asked "How was your trip?" And started laughing.

“You’re a spook now. Watch your back!” He laughed again.

“Wow!” I said. “They are awfully serious about these secrets, this classified stuff.”

Jim smiled again and said, “Well, that’s because they use these equations to calculate aiming points for ballistic missiles – nukes. But relax. Let me explain about classified. The classifiers feel good because they think they are protecting the country and it provides lots of employment for our security agencies. But do you really think that there is no one else in the world smart enough to solve the problem, the solution to which they have classified? You technicians, with a little time and help from the team, could work it out. Classifying a result is the news that the curious need to begin their own work – and often as not they solve it better. It’s like a game to the naturally curious.”

Sound familiar?

A year later, I was back at CROND and rocket science and games came up again. The scientists at CROND had developed a much more robust REDIST system, capable of handling more data, with better computational abilities able to reiterate alternate solutions. But there was one thing missing; no state had used our system to actually implement a redistricting plan.

One afternoon I was working with my fellow techs at a game of sorts. We were adding registrations and voting results to the inputs because the courts were curious about how one of our plans would alter the political landscape. But, as we developed our game, it was to see if we could come up with the best plan that met the population equality requirement (+/- 5%) and maximized compactness, and yet still won handily. The game was to do three plans – one for each party and one that made the state a real toss-up. We were using New York since the Dean of the NYU Law School was heading a commission there and had asked CROND’s help.

And the phone rang. I answered. The caller identified himself as from the Secretary of State’s office in Mississippi. He said they might like to purchase our system or contract to use it. But he had some questions. I replied that I would have to talk to the director about such an idea, so he asked what my role was. I told him that I was responsible for the data inputs and results mapping. He then began asking about how our system operated and what criteria and data inputs we used. Then he came back to the census data and asked whether we input all the census data in the files or just basic population numbers. I replied that we put it all in since it was easier to manipulate it in the machine rather than change it on the tapes. Our algorithms could pick what it needed. He then suggested that I have that conversation with management about what it might cost for his state to buy or use our system.

That evening, at the management meeting, after the usual talk about progress and schedules, I mentioned the call. There was great excitement. All five scientists cross-examined me about the conversation over and over. Then Jim Weaver sat back, puffed on his pipe, and said.

“Run that part about the data by me again.”

“He asked us what we used for inputs. I told him we use the tapes from the census bureau. And some of that National Location stuff for coordinates.”

“And he asked you again about the content of the census data?”

“Yes, he wanted to know if it all went into the machine. Several times.”

Jim puffed on his pipe, fell silent. Then said, “We can’t do it.”

Uproar. Questions being hurled at Jim – why not, what was he thinking? When they calmed down Jim said,

“You know what they’re thinking. They’ll gerrymander the black population out of any influence. You know how it works. Take someplace with a population of 60 blacks and 40 whites. You set it up with three districts – then pack 34 blacks into that one, and split the remaining 26 into two districts - so there are 13 of them in each other district. Then you carefully put the 40 whites in those same two, 20 each. The end result is two white legislators being elected with 20 to 13 – almost a 30% margin while the one black legislator gets 100% of his voters – and, presto, a black majority of 60% is turned into a white majority of 67%. It ain’t Rocket Science – it’s called “packing and cracking.”

The counter argument was vehement; that we couldn’t know that’s what they were going to do; that we could supply data without the racial component or alter the algorithm to skip those fields; one scientist argued that Tommy and Jack were already adding data to the computations and if they could do it - it wasn’t rocket science and there were surely smart enough people in Mississippi to do it if they wanted to go down that path.

One astonishing moment – one of the scientists looked at Jim, quietly puffing his pipe, and said, “Who do you think you are? With that pipe ... Oppenheimer? You know how science works – so did he. And remember, he finally went along with the development of nuclear power. The stuff we are doing can be used to enhance democracy too by restoring competitiveness just like Tommy and Jack’s game.”

What happened? CROND couldn’t decide so they turned the decision over to the Ford Foundation and the National Municipal League to decide who would get to use the system and what it would cost.

All that I can tell you is this; just seven years later, in 1969, the Federal Courts required Mississippi to redraw the lines for five districts around the state capitol of Jackson. The districting plan in place essentially cracked the urban core of Jackson into five different legislative districts thus cracking the black population into small enough pieces to render it meaningless as a voting bloc.

And since then?

In most states, the legislature dutifully redistricts their state, just after the decennial census data becomes available, to reflect changes in population size and location.

And in some places redistricting has allegedly been used for ensuring adequate representation. In Arizona, the Hopi reservation is entirely inside the Navajo, and any normally compact redistricting plan would have split the Hopi's into two different districts; however, given a long history of land disputes between them, the legislature created an oddly shaped district within the larger Navajo district, proclaiming this gerrymander ensured both tribes a voice in the state legislature.

And in North Carolina there is a very long, very slender, district that legislative leaders claim was created to ensure that an African American legislator would be elected. Or was it just a cynical effort to crack those voters out of other districts where they might have made the districts more competitive?

And, here in Ohio, the Governor is currently a Republican. He was elected with a bare majority which implies a state pretty evenly divided among the parties; yet, the state senate is 70% Republican and the assembly 60%.

This much is clear.

The genie is out of the bottle. The tools continue to be developed by people who aren't You guessed it ... rocket scientists! And they can be used for many ends. By the way, the going rate for a roughly 30 member legislative map, designed to favor you and your colleagues in the legislature, is about \$600,000. My bet is that the price is coming down as more people figure out how to play the game!

Maybe it's like competition. As a matter of principle, we know that it's good for the economy, but if you have ever actually had a business, then you know full well that a tidy little monopoly is so much easier.

In democracy, we know that elections ought to be a competition; but, as a legislator, isn't a tidy little monopoly easier and cheaper? Even the minority legislator, with a district, packed by the majority with minority followers, knows it's easier to run there than in a competitive district.

But democracy is allegedly of the people, by the people, and for the people. That would imply that the voters select their representatives.

What we have today turns that idea on its head. We have a system where the representatives pick their voters.