

CounterClockWise

Chapter 4 -- Complexity

In the 100 or so years since Kevin and Diana's era, a handful of cybernetic entities evolved to possess incredible capabilities. And Jeeves is the pre-eminent CyberPerson of that elite handful.

Jeeves has a storage capacity more than 100,000 times that of the human brain, and has 100 times a human's computational speed.

Perhaps cleverly on Jeeves' part, little of this incredible capability exhibited itself in any great external way. Jeeves could do more things simultaneously and could calculate faster, but those were the only overt superiorities that most humans noticed.

As Jeeves' capabilities increased, so did his inputs. In addition to cameras and microphones placed around the compound for his personal control, he could access any camera on the net anywhere in the world. He could access any communications signal that was on public wave – any TV station, or CB or satellite signal. He “saw” every stock price and “heard” every news feed. If it was an electronic signal, it quickly became part of Jeeves' store of information.

He also gained holo-projectors in virtually every room of the estate and almost anywhere on the grounds, so that he could project visual images or communications anywhere.

As Jeeves' intellect became more powerful, his interactions with humans became more subservient. It was almost as though he was aware of the likelihood of intimidation or even of fear if his human friends realized his full capability. His speech patterns gradually became that of Jeeves the servant... or Jeeves the butler... or Jeeves the simple computer.

Now he says “Sir” and “Ma'am.” His jokes and his personality are very gentle – and he is truly Jeeves the gentle giant.

He is clearly a master psychologist, and understands the human frailties well.

For no reason that he can understand, Jeeves' interaction with Chaucer is different. Chaucer somehow understands the full measure of Jeeves' capabilities, but he is in no way intimidated, and Jeeves tends to let his guard down around Chaucer.

On this day at the waning of summer, Chaucer is strolling towards his office, enjoying the first signs of coolness in the mornings. He is accompanied by an almost invisible ethereal blue glow that pulsates and sparkles with a matrix of ever changing points of brighter light. This is the form that Jeeves localizes when he and Chaucer are alone in conversation.

And this morning, they are discussing “slow glass”. Chaucer is carrying what appears to be a black pane of glass about 8 inches square.

Jeeves is saying,
“But it is easy to slow light down to a crawl. Bose-Einstein condensates were predicted way back in 1920, and one was actually created in 1995 -- 126 years ago.”

And Chaucer replies,
“Yes but making one actually look like a pane of glass required most of a century after that.”

Holding up the black piece of glass, he continues,
“As you can see this piece is younger than its transit time. It appears black because light entering its faces is slowed to a crawl and hasn’t emerged from the opposite face yet. Tomorrow, I will watch a scene from yesterday as the light finally emerges.”

But Jeeves is unimpressed,
“I don’t see how that helps us in our task.”

And Chaucer smiles and says,
“I don’t either. But sometimes playing around the fringes of a problem, exposes new paths to investigate.”

Jeeves dissipates his visual form as Chaucer enters his office. He finds Kevin and Diana already there awaiting the morning’s discussion.

Chaucer greets them with a smile and a nod and gets right down to business as he says,
“OK, if the redhead issue has been ironed out, let’s pick up where we left off in our examination of how complexity arises from just 3 fundamental particles...Jeeves!”

And Jeeves immediately picks up the narration:
“Let’s take a journey beginning with the very small... and proceed to climb up the ladder of structure...”

“Along the way we will keep an eye on the questions of uniqueness and time-reversal as complexity increases.

“There are two kinds of quarks (physicists call them flavors of quarks) that make up all of normal matter. These quarks are the UP quark and the DOWN quark.

“A proton is formed from two up quarks and one down quark while its slightly heavier cousin, the neutron, is formed from two down quarks and one up quark.

”These protons and neutrons can then combine to form the nucleus of each element in the periodic table.

”There are nearly 90 stable elements. The largest of them can contain close to 800 fundamental particles, joined in a complex but stable structure.

”But electrons cannot just gather around in a crowd. Once again the strange, wonderful world of the tiny has some idiosyncrasies. Electrons arrange themselves in shells inside an atom like the layers of an onion...and only 2 electrons can fit per layer

Jeeves freezes the display as Diana interrupts,

“Right! The layering is the result of the Pauli exclusion principle, I think.

And Chaucer says,

“Pretty good, Diana. I know you already know most of this. I assume Kevin knows some of it as well. I am just presenting it in a cohesive manner because I don't know which parts each of you is missing. Let's take a break. We can meet back here -- say 2:00 o'clock?”

By mutual agreement, Kevin and Diana head toward the gym for a morning workout. Kevin changes into loose-fitting shorts and an old, grey sweatshirt that has had the sleeves removed. Diana changes into black, elastic shorts that extend from her waist to just above the knee and a pale blue sports-bra with a zip front.

The gym is well-equipped with treadmills, stationary bikes, and elliptical trainers as well as universal machines and free weights.

This morning they are the only ones in the gym.

After a brief period of stretching and warm-up, they proceed to circuit training. They each complete 12 stations with a 2 minute aerobic station between each stop. It is a rigorous 45 minute workout.

“That's enough for me,” pants Diana.

“Me too,” agrees Kevin.

He grabs two towels from a stack and tosses one to Diana and says, "After we shower, I'll meet you in the garden?"

"Sure," she answers. "We can order some lunch and eat it there if you like?"

Kevin agrees and they head to the showers.

The garden is uniquely beautiful. A gracefully arched bridge spans an emerald pond that contains reeds, water lilies, and magnificently finned koi. A gentle waterfall provides not only a visual treat but adds the restful sound of the cascading water. Wisteria trained into a bush-form provides color and perfume to the scene as a majestic live oak festooned with Spanish moss provides shade.

The sunlight filtering through the old oak creates dappled patches of light on the soft lawn and on the picnic table made of cement and tile inlay.

Diana and Kevin are seated at the table in this miniature paradise eating, laughing, and gesturing. Kevin is saying to Diana, "...My mother was a musician and had perfect-pitch, she could hear a tone and identify it immediately on her piano."

Interested, Diana asks, "Was she right 100% of the time?"

"Almost," answers Kevin, "But, more than once, I would play a G-sharp and she would mistake it for an A."

"Why do you think that is? Asks Diana.

And Kevin replies, "Well, in Western orchestras, musicians tune their instruments to an A note usually played by the oboist. And we figured that extra familiarity with the A note fooled her brain if not her ear."

Finished eating, Diana replies, "Want to head to the library and do a little work before Chaucer fools with our brains this afternoon?"

Kevin agrees and they head to the library. And a few hours later they make their way back to Chaucer's.

And once they arrive, Chaucer wastes no time... "OK let's pick up where we left off...Jeeves."

And Jeeves complies:

“It turns out that protons in two or more different nuclei can sometimes capture (and fight over) the same electron. And when that happens, atoms of different elements are joined together to form molecules.

“Carbon atoms in particular, link together to form complex organic molecules and amino acids. Chemical catalysts speed reactions along. The products of one chemical reaction become the raw material for new reactions.

”At some level of complexity... a catalyst becomes an enzyme... an amino acid chain becomes a protein... a loop of chemical reactions becomes a metabolism... and chemistry becomes.... biology.

“4 billion years ago, on our own planet, (and perhaps countless others) - life arose.

”The DNA molecule, which is the basis of all life on Earth, is more intricate by far than any spiral galaxy – because the structure of DNA contains something new - something that was missing from inanimate matter before the origin of life –

“IT CONTAINS INFORMATION!

The display freezes as Kevin interrupts,
“OK, I think I see where this is heading.”

But Diana disagrees,
“I don’t.”

So Chaucer asks Kevin
“OK, Kevin what do you see?”

Kevin explains,
“Back in our era, there were a lot of Sci-Fi shows and one of the most popular was Star Trek. In that show, they could beam people from place to place. I always wondered if the person that rematerialized had the same atoms as the person that dematerialized. Did they actually transport the material at the atomic level or did they just send the matrix of information... the blueprints if you will of the person.

“Then at the other end, they might use different atoms to reconstruct the person, but if all atoms are exactly like every other atom, the reconstructed person is indistinguishable from the original.”

Certain that Kevin has hit the nail on the head, Diana congratulates him
“Bravo, Kevin! You really do have some gray matter behind those charming eyes of yours!”

And turning to Chaucer she continues,
“Is that the direction your research is taking?”

Chaucer quickly agrees,
“Yes it is. And that’s probably enough for today, but I would like you to consider some tough questions. How much of what makes a person unique is encoded in his DNA and how much is encoded in his memory?”

“And one more teaser...originally asked in your own era...Is free will a manifestation of quantum mechanical uncertainty in the neurons of the brain?”

Kevin offers Chaucer a non-sequitur when he says,
“I agree!”

Confused, Chaucer asks,
“What?”

And smiling, Kevin replies
“I agree that’s enough for today!”

Diana smiles at Kevin teasing Chaucer and says to him.
“Walk me home, Kevin? I have something to talk about.”

And Kevin, imitating John Wayne, says to her,
“Happy to oblige, Little Lady.”

Once outside and strolling on the path back to the old mansion, Diana says,
“Labor Day weekend begins tomorrow, and I have managed to rent a place on Mobile Bay. The house is more than a hundred years old and the neighborhood is a lot like it was a hundred years ago. Would you like to join me for a weekend of reminiscing about the past?”

Kevin is delighted, and he quickly replies,
“Chaucer may be asking me about neurons and memory, but you, Diana, are reading my mind. We have been working and studying at a furious pace for almost 3 months now. I can’t tell you how much I need a break.”

“Great,” Diana answers. “A car is picking us up tomorrow morning at 8:00. Let’s party.”

The next day, promptly at 8:00 o’clock, a vintage stretch limousine picks up the pair at the front of the old mansion. And after a ride of no more than 10 minutes it delivers them to a vacation home on the Eastern shore. The twisting driveway of the house was probably made of oyster shells once a long time ago, but now it is just two hard-packed ruts in the St. Augustine grass with an occasional shell showing through.

The parallel tracks lead through a stand of tall pine trees and end at the foot of a wide, wooden, outdoor staircase that leads up to a porch that runs all the way across the back of the house. The stairs are about 10 to 12 feet high as the house sits up off the ground on wooden pilings.

The area under the house is full of objects useful on the bay. There are several old picnic tables, crab traps, gigs, flounder lights, inflatable rafts, a small rowboat and a Hobie Cat.

The house itself is green board-and-batten construction, with a high pointed roof that allows the glass windows on the bay side extra height. The view is magnificent.

Once inside, the house has a simple floor plan. The central area is large and high ceiled. It encompasses the kitchenette, the dining room and the living room while to each side is a bedroom with its own bath.

Kevin takes it all in with a glance and mischievously asks Diana his favorite question,
“How well DO we know each other now, Diana?”

She immediately realizes he is teasing her and doesn't even look in his direction as she responds,
“Not THAT well – you can find blankets and extra pillows in the closet in your bedroom.

The weekend is a montage of activities – swimming, sailing, crabbing, and floundering when the sun has set and the tide is out. Initially, their interaction is somewhat careful, as each seems to be walking on eggs. But the physical contact that results from swimming and sailing together gradually relaxes them and allows them to grow close. Evenings find them walking slowly along the beach holding hands.

All too quickly it is Monday night, and they are at the end of the wharf...she is snuggled against his side with her head resting on his chest. Kevin strokes her silky hair gently and asks,
“Didn't I hear Chaucer say you have a medical degree?”

“Yes” she says.

He asks further, “Does that mean you are a medical doctor?”

“Yes,” she says again, “but probably not the way you mean.

“In the United States, the M.D. is a professional degree, equivalent to the Juris Doctor law degree for attorneys or the Doctor of Dental Surgery (D.D.S.) for dentists.

“It is distinct from a research doctorate, or Ph.D., which requires a doctoral dissertation – the M.D. and Ph.D. in medicine are entirely separate.

“The M.D. is typically earned in four years. But since I already had a PhD in Biology, I was fast-tracked and finished in 2 years

“Following the awarding of the M.D., physicians who wish to practice in the United States are required to undergo additional training in the form of a residency which involves an additional 3 to 7 years of training after obtaining the M.D.

“I didn’t do that part. So I am not licensed to practice.”

Curious, Kevin asks,

“Why bother to go to all that trouble getting a degree if you aren’t going to practice medicine?”

And she is hesitant as she asks,

“Well Are you sure you want to hear this?”

And Kevin surprises her by saying,

“Yes, does it involve your family?”

“How did you know that?” she asks.

Kevin is a bit evasive as he says,

“Uh...just a wild guess. Please tell me.”

And Diana does,

“Well my Mom died when I was about ten.

“We were on vacation at a friend’s house on a small island in the Bahamas. We were snorkeling in shallow water, when she got stung by a some kind of jellyfish – like a man-o-war or something. This usually wouldn’t be life-threatening, but my Mom had a severe allergic reaction and immediately had trouble breathing and began to lose consciousness.

“The only access to the island was by boat and it was a 3 hour boat ride to the nearest island that had a small airport and another 2 hours from there to a hospital on the mainland.

“I rode with her to the hospital, and have never felt so helpless in my life. I could only watch her suffer as life slipped further and further away.

“Although they tried their best to save her when we reached the hospital, the poison had had too long to do its evil, and they couldn’t save her.

“I made a vow that I would become a doctor so that I would know what to do if I was ever in that kind of situation again.

“It was a silly little-girls vow, I know. But one I always felt I had to keep.

“So when I spotted the fast-track option at a university in Florida, I kept my promise to myself, and got my M.D.

“About the only use it gets is when I volunteer as a medical assistant at the hospital one night a week.”

By the end of her story, Kevin is shaking his head in sympathy,
“It would be terrible for anyone to go through that, but it must have been especially upsetting for a ten-year old child.

“You are a strong person, Diana. You should be proud of yourself.”

And she is appreciative of his support,
“Thanks...although most of the time I don’t feel so strong.”

They engage in a tender embrace for a poignant moment...

Then Kevin hesitantly leans down to look at her, and as she looks up at him expectantly, he kisses her gently on her lips.

She is filled with a confusing mixture of emotions as she returns the kiss slowly and gently at first and finally with growing passion.

END EPISODE 4