



## THERE IS NO TIME IN WATERLOO

by SHEILA HETI *and* MARGAUX WILLIAMSON

**E**VERYONE IN WATERLOO was an amateur physicist, and they endlessly bugged the real physicists as the physicists sat in cafés talking to each other. The amateurs would approach and put questions to them; simple questions, obvious ones. Or else they asked questions that even a physicist couldn't answer, or questions that weren't in the realm of physics at all, but had more to do with biology or straight computation. People who know almost nothing about what they're talking about are often more enthusiastic than the ones who know a lot, so they do all the talking, while the ones who know their stuff stay silent and get red in the face.

Whenever a real physicist would start to correct or explain a point, the amateur would smile and nod, and would loudly proclaim that they'd read something about that in a magazine or a book recently. Then they would start explaining it and the physicist would listen, tight-lipped, or else abruptly put an end to the conversation in frustration.

Then the physicist would return to the Perimeter Institute, which was built on the top of a gently sloping hill, and sigh in relief to be home again, standing at the chalkboard, working out equations.

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One afternoon in March, a rumor went around town that some boy's Mothers had predicted that a kid was going to blow up the mall on the left side of town, so all the teenagers got on their scooters and sped off toward the parking lot there.

As Sunni was leaving her apartment, her mother called out from her usual place on the couch and asked where she was going. Sunni returned and explained about the rumor, and admitted that she was really eager to see the mall be blown up; that she and her friends had so much pent-up energy—they were wild with energy, and simply couldn't wait.

Sunni's mother felt a bit of regret that Sunni was going to watch the mall explode, but she didn't object; after all, if that was Sunni's destiny, who was she to interfere?

At the mall the teenagers spoke excitedly with each other, drawing together and apart, eager for the show to begin. They asked around to discover whose Mothers had predicted the explosion, but no one seemed to know. When after an hour and a half the mall remained standing, undisturbed, they started checking their Mothers to see if they were the one destined to blow it up. It appeared that none of them were.

Now they began to grow tense and upset. It was not the first time something like this had happened. The week before, some boy's Mothers had predicted a fight, but no one had thrown the first punch. A month ago, there was supposed to have been an orgy in the back of the other mall, the nice one, but after standing around awhile they had checked their Mothers and learned that the probability of their participating in an orgy was really low.

It started to rain, as a weatherman had predicted. Dispirited, the teenagers began to drift off. Only Sunni and a few of her friends remained, to finish the conversation they'd been having about film. They each had their own distinct opinions about art, but came together in agreement that drama was an inaccurate reflection of life; the best stories followed the path of greatest likelihood. Indeed, when you thought about the best stories down through time, their greatness and terror came from the fact that the most predictable and most probable thing always occurred.

"Like Oedipus," Sunni said. And in that moment, one of Sunni's friends tossed a match into the air, having just used it to light his cigarette. It landed smack on Sunni's Mothers, igniting a little flame.

“Oh, *fuck!*” Sunni cried, batting her Mothers into the air. It arced, smoking, and dropped on the pavement.

“Oh my God, Sunni—is your Mothers dead?” Danny gasped.

“Nope! Nope! Luckily no!” Sunni replied, picking it up. It was burning hot, and she tossed it from hand to hand. Looking down at it as it cooled, she saw that the screen had been melted into a squinty little eye. The keys were matted down to their wires, and the casing was tarry and charred.

“Still works!” Sunni announced. Then she got onto her scooter, feeling like she was about to faint, and rode to the parking lot around the other side of the mall, her Mothers propped up behind the windshield. She kept glancing down at it, but no glance transformed it from the twisted, charry mess it had been in the glance before.

In the back parking lot, she stopped her scooter and got off and doubled over, hyperventilating a bit, then ran a distance to throw up. When she returned to her scooter and saw her Mothers there, she was overtaken by another spell of dizziness. It wasn't clear yet whether this was the worst, most tragic thing that had ever happened to her, or if this was the most exciting moment of her life. She only knew that she had never felt such vertigo before, and upon asking herself what to do now, then glancing down reflexively at her Mothers for the answer, she was overwhelmed by vertigo once more.

Twenty years earlier, the citizens of Waterloo had grown enthralled by a book written by a physicist who had been invited to spend some time working at Perimeter. The book was called *The End of Time*, and its author had argued in a persuasive and beautiful way that time did not exist; that the universe was static. There were a slightly less than infinite number of possible futures hanging about, like paintings in an attic, all real but out of reach, and each person's destiny was nothing more and nothing less than the most probable of those possible futures.

The people most taken with this idea led fervent discussions on how best to realize the theory in one's own life. Like humans anywhere, they didn't want to waste time. They hoped to reach their destinies as quickly and efficiently as possible—not their ultimate destinies, just their penultimate ones. And so it made sense to try and act as much in accordance with probability as they could.

The executives at the BlackBerry headquarters in Waterloo decided they would

capitalize on this desire, and they began producing a machine they tagged *The Mother of All BlackBerry's*. It remained a phone you could email from, but it had an added, special feature: given ongoing inputs, it was calibrated to determine for each user what they were destined to do next.

"It will be a device that determines a person's most likely next action based on previous behaviors. If the input is one's life, then the outcome is one's life," an executive explained to the rest as they sat around a table.

"Brilliant!" said another one, reaching for a Danish. And they all reached for Danishes, and toasted each other, smiling.

The Mothers—as people began calling them—were at once a huge success. They eclipsed everything in the culture at that moment, like any great fad down through time. People in Waterloo consulted their Mothers at every turn, and it quickly became as impossible to live without a Mothers as it had once been to not check email. People wondered how they had managed their lives before their Mothers. They even bought Mothers for their babies.

If life became somewhat more predictable as a result, it was also more comforting, and soon the citizens of Waterloo didn't even notice that they were going in circles; that it was always the same thing over and over again.

The physicists, though nominally to blame for the proliferation of the Mothers, were largely skeptical and had a hundred doubts. It was not unusual to be standing in a supermarket lineup and hear one of them testily provoke and challenge an amateur physicist who was checking his Mothers, if the physicist was having a particularly bad day. "So do these Mothers calculate quantum or classical probabilities?" the physicist might ask; a question over which the amateur might stumble, only to regain his footing upon consulting his Mothers about whether continuing the conversation would be to his benefit, to which the Mothers would reply that the probability was low.

What will Sunni do without her Mothers? I sometimes ask myself a similar question. What would I do if I didn't know what was to come? If the inputs of my past were to disappear, I'd have no idea how I'd behaved in relationships past, and would

not know how to behave in them now. I would play it all differently, not knowing how I was most likely to play it. I might forget how much I once hated to be on a soccer pitch, and how I had avoided soccer ever since. I might, while lounging in a park, say to the soccer players, while rising, *Do you need an extra player?*

If you draw a line across a piece of paper, that is King Street. Now draw a small, perpendicular line crossing King Street near the center. That is Princess Street. That is the part of town where the losers, misfits, and orphans hang out. It's where someone crosses the street drunk, and someone else crosses the street with ripped jeans and a lazy eye.

On either end of King Street, draw a square. These are the two malls. The mall at the right end of town is in the richer neighborhood, near the Perimeter Institute, the University, and the Institute for Quantum Computing—all the institutions representing the heights of Waterloo's excellence. The other mall, the one that the teenagers gathered at, is situated near the Old Town Hospital, City Hall, and the more run-down establishments that deal with the humanities and the human body.

Now watch Sunni speed along the long line of King Street, arriving within minutes at Princess.

Sunni was like all her friends. And all her friends were like Sunni. Their machines resembled the part of the brain that sees patterns and nothing but patterns. To that part of the brain, everything fits. There is no randomness to life, no chance. If ever their Mothers missed something, or something not predicted occurred, it would correct for the future, learning from what happened and fitting this new thing into a better, more complete image of the whole. In this way, if not everything was already accounted for, Sunni and her friends had faith that in time all would be. Life would proceed as anticipated. One had only to walk the determined path.

Sunni had always avoided Princess Street, since only losers hung out there. But since nearly every teenager whose Mothers broke somehow wound up on Princess, it was where she decided to go. She still had the instincts of someone with a Mothers, and wanted to waste no time before moving on to the likeliest next stage of her

destiny. She parked her scooter and walked straight into one of the bars, pushing its red door open.

Two teenagers she had never seen before were sitting on tall stools, smoking and drinking, and upon entering Sunni could hear them whisper: *Doesn't she look like Shelly? No, but she reminds me a lot of my grade-four gym teacher. Actually, today in its entirety reminds me a lot of grade four.*

She went to perch on the stool beside them, and then she said hi. They regarded her blankly. Without waiting for a sign of their interest, she explained that she had lost her Mothers that day.

The boy nodded solemnly. Once your Mothers is dead, he knew, it's gone for good. The factory had shut down seven years before due to lack of any demand for the Mothers beyond Waterloo, and not a single repair shop in town knew how to fix the machines.

The boy explained that the very same thing had happened to him four years ago, but told Sunni not to worry; life would not be as different as she feared. Having said this he turned to face his friend, finishing up the anecdote he had been telling about his childhood, concluding, "And I still feel its reverberations today." Then they put down their money and began packing their bags to leave.

"Wait! Wait! Where are you going?" Sunni cried anxiously, and the boy sighed deeply and said, "Relax. Personality is as static as time; it's a fixed law. People don't change. As long as you remember that, you'll be all right. Now we have to go and write in our diaries." Then they left.

Sunni, still sitting there, glanced down at her Elders pin as it began to blink and beep.

Time is a measurement of change. The change in the position of quantum particles cannot always be known, because they don't seem to exist in any fixed spots. At the level of human bodies, we can see that time has passed because one moment I'm here at this table, the next I'm there at the stove. But at the quantum level, everything is cloudy. This is the mechanism for the disappearance of time. The people of Waterloo liked this theory because, deep down, they felt it. Their lives, in many ways, reflected it. *The End of Time* simply stamped their intuition with the air of authority and truth.

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“No,” said one of the physicists, standing in the park under the gazebo, to the twenty-odd citizens picnicking around her. “We *don't* all believe that time is static.”

The picnickers smiled up at the physicist. They continued to eat their bread and sandwiches and throw their strawberries into the grass.

Though Sunni sped down to City Hall as soon as she received the call, she arrived a little later than everyone else, as was typical for her. The other Elders were already there, waiting for the emergency meeting to begin.

The teenagers of Waterloo, whose Mothers had been receiving inputs since the day they were born, were believed by everyone to have a more accurate grasp of what the future would bring. Compared to their Mothers, their parents' Mothers were deeply lacking: twenty, thirty years unaccounted for. So a special place in Waterloo was reserved for the teenagers. They were given much respect. They bore the official title Double Special Elders, since having a particular destiny is the essence of being Special. They were paraded about on ceremonial occasions and called in to advise the city on all the important matters.

Sunni crept quietly through the side door and up to her seat in the fourth row of the dais, which seated thirty across. Already the city's two hundred and fifty-eight native-born teens were in their seats, and they glanced at Sunni and watched her take her place, though she had tried to make her entrance subtle. The mayor, standing at the podium before them, was in the midst of explaining the current crisis, but after two minutes, Sunni was still totally lost, so she whispered to the boy beside her, asking him what she had missed.

He replied quickly, “This morning Perimeter received word from Africa that all the problems in physics have been solved.”

“*What?*” she whispered back. “Are you *sure?* The measurement problem and—”

“Yes, yes, *everything,*” he insisted hotly. Then he rolled his eyes. “Don't ask me.”

Sunni sat back in her chair, stunned. The mayor was now on to the mundane, municipal details, explaining how much it cost the city to fund the institute, claiming that it would be humiliating for Waterloo to carry on the project of physics when the field was now kaput. He gestured toward the two physicists who had

come to explain the proof, should anyone want to hear it. He said that they represented the physicists who believed the institute should be kept alive—not because the African proof was wrong; it wasn’t—but for reasons that he, the mayor, did not completely understand, though if one of the Elders wanted to hear their reasoning, the physicists could give it. As for the rest of the physicists, they were too preoccupied with going over the proof to attend the meeting that day.

“Would any of the Elders like to see the African proof?” the mayor asked.

Sunni looked around tentatively. No one else seemed to want to hear it, but she was interested, so she raised her hand. The mayor nodded at the physicists, and the younger of them stood and went to the whiteboard and began drawing an equation and a little diagram. He turned to the Elders and began to speak. He was only a few sentences into his elucidation when the mayor interrupted him to exclaim:

“Aha—look! It’s like an earthworm praying!”

At which point the physicist violently threw his marker onto the ground and left the whiteboard and sat down beside his colleague. He was too upset by the events of the day to push forward. It wasn’t even so awful that a proof had been found; the pain in his heart was about how unsatisfying a proof it was. It just wasn’t the beautiful, elegant thing that everyone had been hoping for.

Sunni wanted to ask the physicists what the African proof said about the absence of time, but just as she was about to raise her hand again, the boy next to her leaned over and pointed at Sunni’s Mothers, which she still reflexively clasped tightly.

“Is your Mothers *dead*?” he gasped.

Sunni, hiding it quickly under her coat, replied with feigned ease, “Nah, it’s just a new sleeve. My architect friend made it. He’s cool.”

“I wouldn’t want a sleeve that looked like that.”

“Never mind.”

“You should take that sleeve off.”

“One day I will.”

Then the mayor turned to the teenagers and asked, “Should Perimeter be closed?” In this way the voting began.

The first Elder spoke: “Yes.”

The second Elder looked up from her Mothers, which knew that once you began talking about ending something, usually that thing ends. “Yes!” she said.

The third Elder spoke. “Yes.”



And on and on it went: yes yes yes yes yes yes.

Now it was Sunni's turn. She hesitated, glancing down at the blank screen of her Mothers, which she had pulled from under her coat. It was a twisted, black, charry mess. She took a deep breath, and said very quietly, though loud enough for everyone to hear: "I am no longer Special."

Then she stood up from her place on the dais and climbed carefully down the steps. It was a humiliating walk, one others had performed before her while she had watched in pity and fear. Behind her there rose a wall of whispers; it was the world Sunni had been part of, sealing itself closed behind her.

She walked past the mayor and beyond the physicists, toward the doors at the end of the hall. Just before she slipped out, she heard the mayor announce the tally of the vote: it was unanimous. Perimeter was to be shut down that hour.

"Fucking teenagers," the older physicist muttered.

Sunni stepped out into the breezy air of the afternoon, blinking and adjusting to the brightness of the day. She stood on the steps of City Hall, thinking nothing, a blank, faintly bewildered. Her eyes rested on a tree that stood a short distance away in the grass, and she watched it gently sway, moved by the breeze. What would move Sunni, now that her Mothers was dead? With each day, she felt, her destiny would be less and less clear, and less and less would what was probable be the law that ran her life. She tried to imagine what other law might come to replace it, but no other laws came to mind.

Perhaps, she mused, she could learn about living from this tree—let the laws that moved it move her as well. At base, she knew, she was made up of the very same particles as the tree; she must, in some sense, be treelike. She stepped down onto the lawn.

But at that moment, her attention was distracted by vague sounds in the distance. She squinted her eyes; there seemed to be a lethargic parade approaching from the far end of King Street. After watching a moment, she realized what it was: a small tide of dejected physicists was flowing out from the doors of Perimeter. They came closer, heaving down King Street with stooped posture, dazed, carrying boxes of computers, papers and chalk, streaming toward their cars, which would take them back to the university towns from which they had come.

“How pathetic,” came a small voice.

Sunni turned and noticed that sitting cross-legged beneath the tree was a scrawny boy around her own age. From the first glance she could tell that he was a loser, but such a loser he wasn’t even a Princess Street loser.

“They don’t have to leave,” he said.

“But it’s their destiny,” Sunni replied. “I was in the meeting. I saw it happen.”

The boy looked at her skeptically, pushing his bangs away. “Destiny? There’s no destiny. These physicists don’t believe in the future. Most of them don’t, anyway. I know. I’m good friends with some of them.”

“But—” Sunni shook her head. “If there’s no destiny, how can you tell what’s going to happen next?”

The boy, whose name was Raffi, frowned. He paused a moment, and then he went on to quietly explain, barely raising his voice above a whisper, so that Sunni had to move closer to hear.

He told her that last year’s Bora Bora proof, which contributed to the African proof, revealed that not everything that comes to pass can be known in advance, that everything is in a continuous state of cocreation and coevolution with everything else. The universe is utterly non-computable and non-predictable—possibly not mathematical, at essence, at all. No future can exist until it exists, since we are all creating reality together in a radically flexible present. “Things can go in different ways,” he said. “The possibility of creating genuine novelty, while rare and precious, is real.”

Sunni sat back hard against the tree. The Bora Bora proof was impossible! She turned her head as the Double Special Elders emerged from the tall doors of City Hall and began spreading across the lawn, moving off, heads bent low over their Mothers as they decided what to do next. She was about to say something when, in the distance, a blue spiral lit up the sky.

Sunni gasped. “It’s the fighting,” Raffi said quietly. “It’s coming closer, I see.”

“What fighting?” Sunni asked.

He said slowly, “You’re a Double Special Elder through and through. You didn’t even know.”

Now another explosion burst blue in the distance, near the mall. A high-pitched radial whistle could be heard emanating from it. Raffi got up like a smooth animal. He bent over and started rummaging in the large duffel bag that had been beside him in the grass.

Sunni pushed herself closer to the tree, astonished. In the distance, a physicist in a red overcoat had turned around and begun to walk back toward them. Raffi looked up to answer the question on Sunni's face and explained, "It's a Turquoise bomb. We might know how to handle this." The physicist came near and Raffi walked off with her, in the direction of the institute and through its front doors.

Now Sunni was alone. She stood up from the ground and watched the Elders, most of whom were gazing up into the distance where the spiral still hung. She watched as they looked down at their Mothers to make sense of it; to know how to respond. But their Mothers had no valuable insight; could not fit the spiral into the pattern; had never known such a thing before.

*Get on your scooter and go home*, was the instruction on their screens; an instruction applicable to many situations, and the most common one.

The teenagers made their way to their scooters, sure in their movements, for deep in their hearts they felt a cool reassurance: it was not that their Mothers lacked insight, but that the question they had posed about the explosions was not a pertinent one. What happened in the distance had nothing to do with the patterns in their lives. It had nothing to do with all the ways they were special. They got on their wheels and, like the physicists, sped off from the heart of town.

Sunni looked up as an acorn fell from the tree and landed on her head. She thought about what she knew.

*Conceived with special help from physicists Sean Gryb, Aaron Berndsen, and Lee Smolin*