ALL THAT WE SEE OR SEEM

WRITTEN BY KEN LIU

THE DANDELION DYNASTY

The Grace of Kings
The Wall of Storms
The Veiled Throne
Speaking Bones

SHORT STORY COLLECTIONS

The Paper Menagerie and Other Stories
The Hidden Girl and Other Stories

TRANSLATED BY KEN LIU

The Three-Body Problem (by Cixin Liu)
Death's End (by Cixin Liu)
The Redemption of Time (by Baoshu)
Waste Tide (by Chen Qiufan)
Vagabonds (by Hao Jingfang)
Jumpnauts (by Hao Jingfang)
Laozi's Dao De Jing (by Laozi)

EDITED BY KEN LIU

Invisible Planets
Broken Stars

ALL THAT WE SEE OR SEEM

KEN LIU



An Ad Astra Book

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This is a work of fiction. All characters, organizations, and events portrayed
in this novel are either products of the author's imagination or are used fictitiously.

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Is all that we see or seem
But a dream within a dream?

—EDGAR ALLAN POE

What is commonest, cheapest, nearest, easiest, is Me,
Me going in for my chances, spending for vast returns,
Adorning myself to bestow myself on the first that will take me,
Not asking the sky to come down to my good will,
Scattering it freely forever.

—WALT WHITMAN

PROLOGUE

One step. Another. Pause.

She waits until Piers's snoring resumes its steady pace.

One more step. She's out of the bedroom.

Turning around, she whispers her goodbye. The curtains are tightly shut so that not even the moon can peek in, and Piers is just an indistinct lump in the bed. They've had a good life together. Better than most. She's sorry that he'll be devastated. He loves her and she loves him, but love isn't enough.

It's not enough to save her from this story about herself, this waking dream that has turned into a nightmare. She's a Shahrazad tired of telling lies to delay the inevitable, night after night. True, it's her own fault that she ended up here. At least she's now doing something about it.

She pulls the bedroom door shut, turning the knob so that it latches silently. Usually, the hinge would creak like a cartoon witch, but she had the foresight to oil it earlier that day. Good planning—the corner of her mouth curls ironically at the thought—if only she had always seen ahead.

Every step leads to another. Closer to the edge. At some point, you

run out of steps.

She slips into her studio—what would otherwise be a kids' bedroom in the suburban colonial two-story—and ties up the loose ends. She doesn't turn on any lights; the glow from all the screens and LEDs is enough. It only takes her about ten minutes to reassure herself that she had cleaned up after herself and to erase anything that had to be left till the last minute.

She thinks about erasing more: all the practice session recordings; her own encrypted cephaloscripts; the dream-guide neuromesh of her personal AI; the interviews, fan messages, reviews—food for her vanity, training data for her egolets. Her fingers hover over the keys for a long moment.

In the end, she pulls back. She tells herself it doesn't matter; erasing all this stuff won't make Piers safer. In fact, keeping them around may be helpful, something to remember her by and something to bargain with. There will be darkness, shadows, danger, terror. It's the least she can do to help him.

But deep down, she knows that she can't go through with it because she can't kill herself. She has painstakingly built this idea of her, of Elli Krantz, over more than a decade.

Or maybe this has never been her *self*. That is the question and the reason and the entire point, isn't it?

Maybe she can't get away. Faustus tried and failed. But she has to try.

Slowly creeping over the floorboards to suppress any creaks, she finally steps into her soft boots, pulls on her long wool coat (March nights in Massachusetts are still very cold), and picks up her waterproof backpack. Holding her breath, she twists the handle and slowly opens the front door, listening for noise from upstairs.

The frosty air makes her shiver. The waning moon hangs from the maple on the east lawn like a question mark. If Piers wakes up now, she thinks, it will be a sign. I won't do it.

There is no noise.

She lets out the held breath. That's also a sign.

The darkness beckons. She steps out, slowly closing the door behind her and latching it with the softest click.

She's gone.

ONE

Julia looked up wistfully through the single window high up on the wall of her tiny basement studio. The sky was pure celadon blue, and not a cloud in sight.

She imagined the park half a mile away, with that expansive, lush lawn sloping down to the rocky beach, licked by gentle waves, as though the Atlantic Ocean was feeling lazy and indulgent on a day like this. The sidewalk next to the park would be filled with working-from-home joggers, moms pushing strollers, dog walkers flirting while their charges sniffed each other. It was a glorious Monday morning in March, unseasonably mild for the South Shore.

No time to play. She had a job to do.

Sighing, she pulled her mind back into the murky interior of her unit, where the smell of instant ramen and greasy pizza never dissipated. She took a big swig of coffee and refocused her eyes on the monitor, tiled with black terminal windows full of scrolling white text and 3D canvases showing colorful abstract visualizations.

"Come on," she whispered, "what did you do?"

The worm designer would hardly win any points for fashion. Nobody hid anything inside the non-rendered HTML portion of an email

these days; it was an obsolete attack vector. Yet, maybe the attacker was very clever, for wasn't an outdated exploit just right for the outdated IT systems deployed in public schools?

So far, Julia had ascertained that the worm had initially arrived in an email sent to an unmonitored "information@" address for Paine Middle School, "just asking questions" about the large number of migrant children enrolled at Paine. The worm had been ingested by the auto-responder, which then passed the message (including the hidden text) to the school district's hosted embodied language model to generate a routine response. But the hidden text turned out to be a malicious prompt designed to elicit the HELM to produce a series of *new* prompts, requests for more information from the rest of the system as well as the aid of accessibility modules—essentially, the worm was fooling the system into thinking that to respond to the unsolicited email, it needed to call in specialized visual formatters, translators, audio synthesizers, policybots, and ed-law jurijinns—but not a human—to make a legally compliant response. When submitted to these silicon experts, the prompt led to solicitations for yet more aid. To coordinate such a large group of niche AIs, the HELM elevated the query's resource allocation and permissions—a common flaw in older systems patched together over time to keep up with new needs.

"After several cycles of adversarial prompt augmentation, the worm had essentially the same privileges as an admin user and could access whatever it needed on the school district's networks," Julia said into the microphone. Talos, her personal AI, recorded everything so that it could produce a report of her analysis later.

She felt some pride: learning this much would have taken a professional team days of work, and she didn't even have access to all the systems that the HELM interacted with. "This is one of the nastiest jailbreaks I've ever seen." Then, in a whisper, she added, "But also rather elegant."

The worm was in the middle of uploading gigabytes of encrypted data to an offshore server when Cailee, the principal's administrative

assistant and Julia's childhood friend, caught it and shut everything down. Now Julia was picking through the system logs and the HELM's etherized neuromesh, the dense substrate of nodes and links holding the artificial intelligence's memories, hoping to extricate the worm and figure out what damage it had done.

"Could you clean it out of the HELM and get it back up and running ASAP?" Cailee had begged. "It literally runs everything for the district."

Cailee was one of the few friends Julia had kept from childhood. They had stayed friends only because Cailee had moved away in fifth grade, before Julia had been turned into "Commie Dorothy," the "neighborhood blight," the "orphan hacker," and a whole bunch of other names that Julia preferred not to think about at all.

Total wipe followed by data restoration was not an option because, of course, the district's last backup was from more than six months ago.

Julia spun the main visualization around, trying to discern the worm's traces in the neuromesh. There were so many dimensions that even with aggressive AI-assisted principal component reduction, the visualization resembled a chaotic mess of tangled yarn. She pulled tentatively with her mouse here and there, which only worsened the disarray.

She took another big swig of coffee and banged away on the keyboard, firing off a new visualization.

Her fiscjinn had not wanted her to take on this investigation at all.

"It's not a job if it doesn't pay."

"I'm doing fine. I can always join another security bounty hunt before the end of the month if I'm short."

"That's what you said last month, and the month before that," the financial AI informed her. "And you have not, in fact, collected any bounties. Instead, you've been tinkering with toy robots and contributing code to nonprofit camera-jammers. What you need is a steady

income, something we can count on. You're already more than ninety days late with the maintenance—"

"Okay."

"—more than sixty days late on the gas—"

"Okay! I get the picture. Can't you do something about the bills? Like, negotiate harder with the collectbot? Surely you can network with the tenant-advocacy public interest jurijinns and find a loophole somewhere?"

Unlike most people, Julia didn't subscribe to a single commercial omni-AI to handle everything in her life. Instead, she relied on open-source versions of domain-specific machine-learning systems for her fiscjinn, everyfixit, and other AI needs. She didn't like the idea of turning her life over to the algorithms of the cloud giants. Even Talos was a custom job, something she built herself.

"Believe me, I've already tried every trick in the book. If you're late again, they're going to cut you off. You need to start adulting, kiddo."

Even though her heart clenched for a second, she didn't regret giving her fiscjinn her mother's voice. She had made the jinn extra responsible, a real hard-ass. We never stopped wishing for our parents to be better than they were.

"I can't talk about a job right now," she said. "I just can't."

Six years had passed since the raid on Cartographers Obscura, but she still flinched whenever a neighbor's door slammed too loudly down the hall, and her heart pounded whenever police sirens wailed down the street. Nick had paid a fortune out of his pocket to get her therapy, which hadn't helped. The past wasn't past. She couldn't even finish college and had dropped out a year ago. The idea of her holding down a job was a fairy tale.

"You can't keep on putting off what must be done." The fiscjinn was relentless. "You should be out looking for work instead of doing favors for free."

"I can't let Cailee down." Her voice had slipped into pleading without her realizing it. "Also, we're talking about children here."

Children's data could often be worth more than adults'. Because privacy laws kept their personal data out of most aggregators, exchanges, and monitoring services, children's identities had the benefit of being verifiable without being lived-in. Voice profiles and agefakes created from children's data were more likely to fool scam-detecting algorithms because there was little real data to check against. It was thus easier to use their pristine identities to apply for loans that would never be repaid, to cover criminals with no usable identification, to be the scapegoats left behind after a scheme fell apart. It could be years before the victims, now adults, learned of what had been done in their names, with their virtual profiles in ruins.

And that didn't even cover all the horrible things that could be done with pictures and videos of children by the irredeemably evil.

Yet, compelling as they were, these weren't the real reasons she wanted to do the investigation. *We're talking about children here.* She wasn't sure if she was pleading on behalf of the children at Cailee's school or replaying a ghostly argument that she wished someone had engaged in on behalf of another, much younger Julia long ago.

"You have a responsibility to yourself, too," said the AI wearing her mother's voice.

For a moment, Julia was so overcome that she couldn't speak.

But she was no longer a child. She remembered she was talking to a bot.

"I'm doing it," she said. "You'll just have to figure out how to fend the bills off another month."

"All right," said the fiscjinn.

Around two in the afternoon, Julia finally admitted defeat. The whole morning had been lost to dead ends; she needed to go outside.

Pulling her long, dark hair into a ponytail, she put on her jogging clothes and left the apartment. Running was when she did her best thinking.

She didn't take a phone—she didn't use one regularly, since the mandatory tracking hardware couldn't be disabled easily. She didn't wear her sensepin either; she never did when she ran. The idea of "data-driven self-improvement," so enamored of by some in Silicon Valley, was nonsense to her. Data was like pollution: the less of it one generated, the better.

Running in the afternoon had its charms—the sun was still bright, and the spring chill in the air had largely dissipated. She could feel herself relax as she deepened her breathing and counted in her head to keep pace. The purity of physical movement, so different from the passivity of forensic data analysis, was a balm to her. She luxuriated in the strength of her muscles, the suppleness of her tendons, a quiet and deep joy building and coursing through her.

A couple of seagulls perched on the widow's walk of the big colonial at the corner of Lantern and School watched impassively as she passed by.

She took Lantern instead of Shawmut Avenue to get to the beach, partly for the view of the stately row of elms that she liked, but also because the houses along the street had fewer door cams. To allow data about yourself to be collected was to allow data about yourself to be leaked. Once a piece of data existed, you couldn't predict where it would end up. She didn't use social media, said no to every tracking request, and had Talos clean up after her trails every time she browsed. She rarely took selfies, and when out with friends—vanishingly rare occasions—she always volunteered to take the group pictures.

At the end of Lantern, she turned onto Shore. The beach park was exactly as she'd pictured it: inviting lawn, sun-drenched waves, people strolling around looking a little dazed, as though they had forgotten what the sun was after a long winter. New England winters would do that to you. There were even a few close to her age throwing a frisbee around.

She stopped at the large oak in the center of the lawn, panting hard. Lacing her hands behind her head, she strolled around, letting

her breathing return to normal. Two seagulls glided overhead, their mouths wide open as they squawked at each other, so much more graceful in this aerial realm than their awkward stance on land. How wonderful it was to be alive, she thought, to stand here on the edge of the boundless ocean, matching her breaths to the movement of the waves, completely at peace, anonymous, comfortable that everything was how it should be. Sure, she might have an empty bank account and a shoebox apartment for which she was paying too much, but compared to where she had been, she was doing fine. Very fine indeed.

It was movement that brought joy, that made you feel alive. Virginia Woolf was right and she was also wrong. A room of her own was necessary but not enough. To really think well, one had to be able to move, to move freely without feeling you were being watched. Only through movement could you truly understand the nature of a thing, whether seagulls or humans.

That was it. The thought sent a shiver of excitement through her body. She ran home as though she were in a race.

Hutch, who had taught Julia the art of visualization, had told her that the nature of anything, including cognition, was best understood in the *doing*. She missed his wisdom.

Instead of struggling against the infected artificial brain in its frozen state, she had to reanimate it.

First, she needed space. In the same way writers always wanted bigger desks and programmers craved bigger monitors, she had to find a canvas large enough to visualize the living neuromesh. Mixed reality was the only answer.

Pushing her coffee table to the wall and stacking the chairs, she cleared the center of her apartment as much as possible. Talos would just have to do its best to map whatever debris was left into the visualization.

Next, she needed a "brain jar." Digging through her crates of salvaged hardware—being a pack rat for old hardware was a prerequisite when one's hobby was building shape-shifting drones—she found a bunch of graphics cards pulled from used gaming PCs. These she plugged into a retired crypto mining rig until the whole assembly looked like matzot stuffed haphazardly in a box.

This wasn't very powerful hardware, but it was enough to run the ancient embodied language model s-l-o-w-l-y, perfect for her purposes. She imaged the HELM into the jar, spun up the cooling fans until her apartment sounded like the runways at Logan Airport. A quick exchange with Talos to load up the right visualization jinns, and she was ready.

Standing in the middle of the floor, she put on her fusion vision glasses (the specs were two generations behind, but they had the virtue of not requiring a cloud subscription), made sure the bone-conduction speakers were pressed against the sides of her skull, and pushed the button at the temple.

Instantly, her apartment faded away, to be replaced by a dark void.

"Begin," she instructed Talos.

A brilliant shower of sparks all around her. It was the Creation, the Big Bang of a neuromesh. The HELM was booting up.

Gradually, the explosions settled down into a dim, homogeneous glow, a nebula of primordial data, a latent space for potential stars. From time to time, muted waves passed through. The HELM was waiting for prompts.

"Give me the grade distribution of all seventh graders," she said.

It was a simple question that probed the model's analytical and security responses. She watched as the query, represented as a bright streak in latent space, something halfway between a bioluminescent eel and an ice-tailed comet, swam through the model, generating rippling waves of light that bounced off each other, interfered with one another, constructively and destructively, gradually coalescing, propagating and back-propagating, like sonar waves probing and mapping

an underwater cave, revealing hidden structures, invisible shoals, silent currents.

Julia walked about, looking for signs of damage from the worm, shrinking and expanding the visualization by spreading and pinching her fingers, dragging and pushing the virtual space around when she neared the boundaries of her free-roam floor. The investigation engaged her whole body, heightened her senses.

Contrary to early theorists, sensory immersion wasn't critical to the success of mixed-reality computing, but the sense of control was. The kind of interactions Julia was engaged in, involving sudden changes in scale, abrupt shifts in virtual location, and a confused metaphor of moving herself as well as the space around her, and all done with a set of low-resolution glasses with basic camera tracking, would have been judged by those theorists as too disorienting, having no analogs in our experience of real space. However, the human mind is remarkably adaptable. Just as cinema taught us that the Aristotelian unities of space, action, and time are not, in fact, necessary to compelling and cohesive drama, the adoption of cheap mixed-reality computing showed that we don't need things in virtual space to map all that closely to reality.

She continued to probe the model with a series of increasingly complex queries. Each of these creatures of light multiplied into subqueries and side queries, a glowing menagerie of exotic life-forms crisscrossing the void, their wakes and ripples gradually illuminating the entirety of the submarine cave.

Having digested all publicly available data on the type of HELM that Paine Middle School used, including sample generation snapshots and performance profiles, Talos was comparing what it observed in the infected HELM against the expected norm. Detecting deviations from the routine, the stereotypical, was a forte for AI. Soon, it alerted Julia to an anomaly, a shadowy formation that shouldn't have been there. It was like a wreck found on the bottom of the seafloor, a mute testament to an act of malignant destruction.

"Gotcha," Julia whispered, heart racing with the thrill of the hunt.

It was all she needed. Once she had a single example of the kind of damage the worm did, it was easy for Talos and her to locate other instances, extrapolate trends, reconstruct modi operandi. In addition to stealing students' data, the worm had also altered some records, perhaps for no better reason than simple malice. It had accessed files and images on the school network to embed itself to reinfect the HELM later, even after a cleansing. It had even reproduced itself in schedule emails, uploads to state regulatory bodies, messages to parents.

It would take effort, a lot of effort, to heal the HELM (Julia had a faster visualization-based approach, but she could more easily teach the school's staff how to do it in a brute-force, symbolic way), scrub the infected files, warn the worm's new intended victims, and alert the parents of affected students. But at least now they knew what to do.

Relief suffused her as she shut down the howling fans and halted the brain jar. Drenched in sweat, she enjoyed the glow of a task well done.

She was writing up her analysis and list of recommendations for Cailee when Talos chirped, "You have a visitor."