



EXISTENCE

DAVID
BRIN

"In Existence, David Brin takes on one of the fundamental themes in science fiction—and what is also one of the fundamental questions humanity faces in this century. Since Brin is both a great storyteller and one of the most imaginative writers around, Existence is not to be missed."

VERNOR VINGE

EXISTENCE

DAVID BRIN



A TOM DOHERTY
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To “Tether Joe” Carroll, who spins real space lariats ...

and

“Doc” Sheldon Brown, who teaches time travelers ...

... and Ralph Vicinanza, who helped many dreams and dreamers to thrive.

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PART ONE
SLINGS AND ARROWS

Those who ignore the mistakes of the future are bound to make them.

—Joseph Miller

SPECIES

*what matters? do i? or **ai?** + the question spins*

*+/- as my body spins !/+ in time to a chirping window-bird
“normal people” don’t think like this -/-/
nor aspies -/- nor even most autistics*

***stop spinning!** -/- there -/- now back to the holo-screen ->*

*rain smatters the clatter window —
bird is gone -/+ hiding from falling water + +
like i hide from a falling civilization*

*what matters then?/? progress? New minds??
after **cortex**, after **libraries**, the **web**, **mesh**, **ai-grid**
— what’s **next** ?/!*

*will it offer hope/doom for foolish humanity +/?
for the glaring cobbly minds +/?
or autistic-hybrids like me +/?*

1.

I, AMPHORUM

The universe had two great halves.

A hemisphere of glittering stars surrounded Gerald on the right.

Blue-brown Earth took up the other side. *Home*, after this job was done. Cleaning the mess left by another generation.

Like a fetus in its sac, Gerald floated in a crystal shell, perched at the end of a long boom, some distance from the space station *Endurance*. Buffered from its throbbing pulse, this bubble was more space than station.

Here, he could focus on signals coming from a satellite hundreds of kilometers away. A long, narrow ribbon of whirling fiber, far overhead.

The bola. His lariat. His tool in an ongoing chore.

The bola is my arm.

The grabber is my hand.

Magnetic is the lever that I turn.

A planet is my fulcrum.

Most days, the little chant helped Gerald to focus on his job—that of a glorified garbageman. *There are still people who envy me. Millions, down in that film of sea and cloud and shore.*

Some would be looking up right now, as nightfall rushed faster than sound across teeming Sumatra. Twilight was the best time to glimpse this big old station. It made him feel connected with humanity every time *Endurance* crossed the terminator—whether dawn or dusk—knowing a few people still looked up.

Focus, Gerald. On the job.

Reaching out, extending his right arm fully along the line of his body, he tried again to adjust tension in that far-off, whirling cable, two thousand kilometers overhead, as if it were a languid extension of his own self.

And the cable replied. Feedback signals pulsed along Gerald's neuro-sens suit ... but they felt wrong.

My fault, Gerald realized. The orders he sent to the slender satellite were too rapid, too impatient. Nearby, little Hachi complained with a screech. The other occupant of this inflated chamber wasn't happy.

"All right." Gerald grimaced at the little figure, wearing its own neuro-sens outfit. "Don't get your tail in a knot. I'll fix it."

Sometimes a monkey has more sense than a man.

Especially a man who looks so raggedy, Gerald thought. A chance glimpse of his reflection revealed how stained his elastic garment had become—from spilled drinks and maintenance fluids. His grizzled cheeks looked gaunt. Infested, even haunted, by bushy, unkempt eyebrows.

If I go home to Houston like this, the family won't even let me in our house. Though, with all n

accumulated flight pay ...

Come on, focus!

Grimly, Gerald clicked down twice on his lower left premolar and three times on the right. His suit responded with another jolt of Slow Juice through a vein in his thigh. Coolness, a lassitude that should help clear thinking, spread through his body—

—and time seemed to crawl.

Feedback signals from the distant bola now had time to catch up. He felt more a *part* of the thirty-kilometer strand, as it whirled ponderously in a higher orbit. Pulsing electric currents that throbbed *up there* were translated as a faint tingle *down here*, running from Gerald's wrist, along his arm and shoulder, slanting across his back and then down to his left big toe, where they seemed to *dig* for leverage. When he pushed, the faraway cable-satellite responded, applying force against the planet's magnetic field.

Tele-operation. In an era of ever more sophisticated artificial intelligence, some tasks still needed an old-fashioned human pilot. Even one who floated in a bubble, far below the real action.

Let's increase the current a bit. To notch down our rate of turn. A tingle in his toe represented several hundred amps of electricity, spewing from one end of the whirling tether, increasing magnetic drag. The great cable rotated across the stars a bit slower.

Hachi—linked-in nearby—hooted querulously from his own web of support fibers. This was better, though the capuchin still needed convincing.

“Cut me some slack,” Gerald grumbled. “I know what I'm doing.”

The computer's dynamical model agreed with Hachi, though. It still forecast no easy grab when the tether's tip reached its brief rendezvous with ... whatever piece of space junk lay in Gerald's sights.

Another tooth-tap command, and night closed in around him more completely, simulating what he would see if he were *up there*, hundreds of clicks higher, at the tether's speeding tip, where stars glittered more clearly. From that greater altitude, Earth seemed a much smaller disc, filling just a quarter of the sky.

Now, everything he heard, felt or saw came from the robotic cable. His lasso. A vine to swing upon, suspended from some distant constellation.

Once an ape ... always an ape.

The tether *became* Gerald's body. An electric tingle along his spine—a sleeting breeze—was the Van Allen radiation wind, caught in magnetic belts that made a lethal sizzle of the middle-orbit heights, from nine hundred kilometers all the way out to thirty thousand or so.

The Bermuda Triangle of outer space. No mere human could survive in that realm for more than an hour. The Apollo astronauts accumulated half of all their allotted radiation dosage during a few minutes sprinting across the belt, toward the relative calm and safety of the Moon. Expensive communications satellites suffered more damage just passing through those middle altitudes than they would in a decade, higher up in placid geosynchronous orbit.

Ever since that brief time of bold lunar missions—and the even-briefer *Zheng He* era—no astronaut had ventured beyond the radiation belt. Instead, they hunkered in safety, just above the atmosphere, while robots explored the solar system. This made Gerald the Far-Out Guy! With his boot for an arm, and the grabber for a hand, he reached beyond. Just a bit, into the maelstrom. No one else had got as high.

Trawling for garbage.

“All right...,” he murmured. “Where are you...?”

Radar had the target pinpointed, about as well as machines could manage amid a crackling fog of charged particles. Position and trajectory kept jittering, evading a fix with slipperiness that seemed almost alive. Worse—though no one believed him—Gerald swore that orbits tended to *shift* in the creepy zone, by up to a few thousandths of a percent, translating into tens of meters. That could make a bola-snatch more artistic guesswork than physics. Computers still had lots to learn, before they took over *this* job from a couple of primates.

Hachi chirped excitedly.

“Yeah, I see it.” Gerald squinted, and optics at the tether-tip automatically magnified a glimmer just ahead. The *target*—probably some piece of space junk, left here by an earlier, wastrel generation. Part of an exploding Russian second stage, perhaps. Or a connector ring from an Apollo flight. Maybe one of those capsules filled with human ashes that used to get fired out here, willy-nilly, during the burial-in-space fad. Or else the remnants of some foolish weapon experiment. Space Command claimed to have all the garbage radar charted and imaged down to a dozen centimeters.

Gerald knew better.

Whatever this thing was, the time had come to bring it home before collision with other debris caused a cascade of secondary impacts—a runaway process that already forced weather and research satellites to be replaced or expensively armored.

Garbage collecting wasn't exactly romantic. Then again, neither was Gerald. Far from the square-jawed, heroic image of a spaceman, he saw only a middle-aged disappointment, on the rare occasions that he looked in a mirror at all, a face lined from squinting in the sharp light of orbit, where sunrise came at you like a wall, every ninety minutes.

At least he was good at achieving a feat of imagination—that he *really* existed far above. That his true body spun out there, thousands of kilometers away.

The illusion felt perfect, at last. Gerald *was* the bola. Thirty kilometers of slender, conducting filament, whirling a slow turn every thirty minutes, or five times during each elongated orbit. At both ends of the pivoting tether were compact clusters of sensors (*my eyes*), cathode emitters (*my muscles*) and grabbers (*my clutching hands*), that felt more part of him, right now, than anything made of flesh. More real than the meaty parts he had been born with, now drifting in a cocoon far below, near the bulky, pitted space station. That distant human body seemed almost imaginary.

Like a hunter with his faithful dog, man and monkey grew silent during final approach, as the sound might spook the prey, glittering in their sights.

It's got an odd shine, he thought, as telemetry showed the distance rapidly narrowing. Only a few kilometers now, till the complex dance of two orbits and the tether's own, gyrating spin converged like a fielder leaping to snatch a hurtling line drive. Like an acrobat, catching his partner in midair. After which ...

... the bola's natural spin would take over, clasp the seized piece of debris into its whirl, absorbing its old momentum and giving that property new values, new direction. Half a spin later, with this tether-tip at *closest approach* to Earth, the grabber would let go, hurling the debris backward, westward, and *down* to burn in the atmosphere.

The easy part. By then, Gerald would be sipping coffee in the station's shielded crew lounge. Only now—

That's no discarded second stage rocket, he pondered, studying the glimmer. *It's not a cargo faring, or shredded fuel tank, or urine-icicle, dumped by a manned mission.* By now, Gerald knew how all kinds of normal junk reflected sunlight—from archaic launch vehicles and satellites to lost gloves and tools—each playing peekaboo tricks of shadow. But this thing ...

Even the colors weren't right. Too blue. Too many *kinds* of blue. And light levels remained steady! As if the thing had no facets or flat surfaces. Hachi's questioning hoot was low and worried. How can you make a firm grab, without knowing where the edges are?

As relative velocity ebbed toward zero, Gerald made adjustments by spewing electrons from cathode emitters at either cable end, creating torque against the planetary field, a trick for maneuvering without rockets or fuel. Ideal for a slow, patient job that had to be done on the cheap.

Now Hachi earned his keep. The little monkey stretched himself like a strand of spaghetti, smoothly taking over final corrections—his instincts honed by a million generations of swinging from jungle branches—while Gerald focused on the grab itself. There would be no second chance.

Slow and patient ... except at the last, frenetic moment ... when you wish you had something quicker to work with than magnetism. When you wish—

There it was, ahead. The Whatever.

Rushing toward rendezvous, the bola's camera spied something glittery, vaguely oval in shape, gleaming with a pale blueness that pulsed like something eager.

Gerald's hand *was* the grabber, turning a fielder's mitt of splayed fingers, reaching as the object loomed suddenly.

Don't flinch, he chided ancient intuitions while preparing to snatch whatever this hurtling thing might be.

Relax. It never hurts.

Only this time—in a strange and puzzling way—it did.

A MYRIAD PATHS OF ENTROPY

Does the universe hate us? How many pitfalls lie ahead, waiting to shred our conceited molecular clusters back into unthinking dust? Shall we count them?

Men and women always felt besieged. By monsters prowling the darkness. By their oppressive rulers, or violent neighbors, or capricious gods. Yet, didn't they most often blame themselves? Bad times were viewed as punishment, brought on by wrong behavior. By unwise belief.

Today, our means of self-destruction seem myriad. (Though *Pandora's Cornucopia* will try to list them all!) We modern folk snort at the superstitions of our ancestors. We know *they* could never really wreck the world, but we can! Zeus or Moloch could not match the destructive power of a nuclear missile exchange, or a dusting of plague bacilli, or some ecological travesty, or ruinous mismanagement of the intricate economy.

Oh, we're mighty. But are we so different from our forebears?

Won't our calamity (when it comes) also be blamed on some arrogant mistake? A flaw in judgment? Some obstinate belief? *Culpa nostra*. Won't it be the same old complaint, echoing across the ruin of our hopes?

"We never deserved it all! Our shining towers and golden fields. Our overflowing libraries and full bellies. Our long lives and overindulged children. Our happiness. Whether by God's will or our own hand, we always expected it would come to this.

"To dust."

—*Pandora's Cornucopia*

2. AFICIONADO

Meanwhile, far below, cameras stared across forbidden desert, monitoring disputed territory in conflict so bitter, antagonists couldn't agree what to call it.

One side named the struggle *righteous war*, with countless innocent lives in peril.

Their opponents claimed there were no victims, at all.

And so, suspicious cameras panned, alert for encroachment. Camouflaged atop hills or under highway culverts or innocuous stones, they probed for a hated adversary. And for some months the guardians succeeded, staving off incursions. Protecting sandy desolation.

Then, technology shifted advantages again.

The enemy's first move? Take out those guarding eyes.

* * *

Infiltrators came at dawn, out of the rising sun—several hundred little machines, skimming low over whispering gusts. Each one, resembling a native hummingbird, followed a carefully scouted path toward its target, landing *behind* some camera or sensor, in its blind spot. It then unfolded wings that transformed into holo-displays, depicting perfect false images of the same desert scene to the guardian's lens, without even a suspicious flicker. Other spy-machines sniffed out camouflaged seismic sensors and embraced them gently—cushioning to mask approaching tremors.

The robotic attack covered a hundred square kilometers. In eight minutes, the desert lay unwatched, undefended.

Now, from over the horizon, large vehicles converged along multiple roadways toward the same open area—seventeen hybrid-electric rigs, disguised as commercial cargo transports, complete with company hologos. But when their paths intersected, crews in dun-colored jumpsuits leaped to unlatch cargoes. Generators roared and the air swirled with exotic stench as pungent volatiles gushed from storage tanks to fill pressurized vessels. Consoles sprang to life. Hinged panels fell away, revealing long, tapered cylinders on slanted ramps.

Ponderously, each cigar shape raised its nose skyward while fins popped open at the tail. Shouts grew tense as tightly coordinated countdowns commenced. Soon the enemy—sophisticated and wary—would pick up enough clues. They would realize ... and act.

When every missile was aimed, targets acquired, all they lacked were payloads.

A dozen figures emerged from an air-conditioned van, wearing snug suits of shimmering material and garishly painted helmets. Each carried a satchel that hummed and whirred to keep them cool. Several moved with a gait that seemed rubbery with anxious excitement. One skipped a little cape about every fourth step.

A dour-looking woman awaited them, with badge and uniform. Holding up a databoard, she confronted the first vacuum-suited figure.

“Name and scan,” she demanded. “Then affirm your intent.”

The helmet visor, decorated with gilt swirls, swiveled back, revealing heavily tanned features about thirty years old, with eyes the color of a cold sea—till the official's instrument cast

questioning ray. Then, briefly, one pupil flared retinal red.

“Hacker Sander,” the tall man said, in a voice both taut and restrained. “I affirm that I’m doing this of my own free will, according to documents on record.”

His clarity of purpose must have satisfied the ai-clipboard, which uttered an approving beep. The inspector nodded. “Thank you, Mr. Sander. Have a safe trip. Next?”

She indicated another would-be rocketeer, who carried his helmet in the crook of one arm, bearing a motif of flames surrounding a screaming mouth.

“What rubbish,” the blond youth snarled, elbowing Hacker as he tried to loom over the bureaucrat. “Do you have any idea who we are? Who I am?”

“Yes, Lord Smit. Though whether I *care* or not doesn’t matter.” She held up the scanner. “That matters. It can prevent you from being lasered into tiny fragments by the USSF, while you’re passing through controlled airspace.”

“Is that a threat? Why you little ... *government* ... pissant. You had better not be trying to—”

“Government *and* guild,” Hacker Sander interrupted, suppressing his own hot anger over the elbow in the ribs. “Come on, Smitty. We’re on a tight schedule.”

The baron whirled on him, tension cracking the normally smooth aristocratic accent. “I warned you about nicknames, Sander, you third-generation poser. I had to put up with your seniority during pilot training. But just wait until we get back. I’ll take you apart!”

“Why wait?” Hacker kept eye contact while reaching up to unlatch his air hose. A quick punch ought to lay this blue-blood out, letting the rest of them get on with it. There were good reasons to hurry. Other forces, more formidable than mere government, were converging right now, eager to prevent what was planned here.

Besides, nobody called a Sander a “poser.”

The other rocket jockeys intervened before he could use his fist—probably a good thing, at that—grabbing the two men and separating them. Pushed to the end of the queue, Smits stewed and cast deadly looks toward Hacker. But when his turn came again, the nobleman went through ID check with composure, as cold and brittle as some glacier.

“Your permits are in order,” the functionary concluded, unhurriedly addressing Hacker, because he was most experienced. “Your liability bonds and Rocket Racing League waivers have been accepted. The government won’t stand in your way.”

Hacker shrugged, as if the statement was both expected and irrelevant. He flung his visor back down and gave a sign to the other suited figures, who rushed to the ladders that launch personnel braced against each rocket, clambering awkwardly, then squirming into cramped couches and strapping in. Even the novices had practiced countless times.

Hatches slammed, hissing as they sealed. Muffled shouts told of final preparations. Then came a distant chant, familiar, yet always thrilling, counting backward at a steady cadence. A rhythm more than a century old.

Is it really that long, since Robert Goddard came to this same desert? Hacker pondered. To experiment with the first controllable rockets? Would he be surprised at what we’ve done with the thing he started? Turning them into weapons of war ... then giant exploration vessels ... and final playthings of the superrich?

Oh, there were alternatives, like commercial space tourism. One Japanese orbital hotel and another under construction. Hacker owned stock. There were even multipassenger suborbital jaunts available to the merely well-off. For the price of maybe twenty college educations.

Hacker felt no shame or regret. *If it weren’t for us, there’d be almost nothing left of the dream.*

Countdown approached zero for the first missile.

His.

“Yeeeeee-haw!” Hacker Sander shouted ...

... before a violent kick flattened him against the airbed. A mammoth hand seemed to plant itself on his chest and *shoved*, expelling half the contents of his lungs in a moan of sweet agony. Like every other time, the sudden shock brought physical surprise and visceral dread—followed by a sheer ecstatic rush, like nothing else on Earth.

Hell ... he wasn't even *part* of the Earth! For a little while, at least.

Seconds passed amid brutal shaking as the rocket clawed its way skyward. Friction heat and ionization licked the transparent nose cone only centimeters from his face. Shooting toward heaven at Mach ten, he felt pinned, helplessly immobile ...

... and completely omnipotent.

I'm a freaking god!

At Mach fifteen somehow he drew enough breath for another cry—this time a shout of elation greeting as black space spread before the missile's bubble nose, flecked by a million glittering stars.

* * *

Back on the ground, cleanup efforts were even more frenetic than setup. With all rockets away, men and women sprinted across the scorched desert, packing to depart before the enemy arrived. Warning posts had already spotted flying machines, racing this way at high speed.

But the government official moved languidly, tallying damage to vegetation, erodible soils, and tiny animals—all of it localized, without appreciable effect on endangered species. A commercial reconditioning service had already been summoned. Atmospheric pollution was easier to calculate, of course. Harder to ameliorate.

She knew these people had plenty to spend. And nowadays, soaking up excess accumulated wealth was as important as any other process of recycling. Her ai-board printed a bill, which she handed over as the last team member revved his engine, impatient to be off.

“Aw, man!” he complained, reading the total. “Our club will barely break even on this launch!”

“Then pick a less expensive hobby,” she replied, and stepped back as the driver gunned his truck roaring away in clouds of dust, incidentally crushing one more barrel cactus en route to the highway. Her vigilant clipboard noted this, adjusting the final tally.

Sitting on the hood of her jeep, she waited for another “club” whose members were as passionate as the rocketeers. Equally skilled and dedicated, though both groups despised each other. Sensors showed them coming fast, from the west—*radical environmentalists*. The official knew what to expect when they arrived. Frustrated to find their opponents gone and two acres of desert singed, they'd give her a tongue-lashing for being “evenhanded” in a situation where—obviously—you could only choose sides.

Well, she thought. *It takes a thick skin to work in government nowadays. No one thinks you matter much.*

Overhead the contrails were starting to shear, ripped by stratospheric winds, a sight that always tugged the heart. And while her intellectual sympathies lay closer to the eco-activists, not the spoiled rocket jockeys ...

... a part of her still thrilled, whenever she witnessed a launch. So ecstatic—almost orgiastic.

“Go!” she whispered with a touch of secret envy toward those distant glitters, already arcing toward the pinnacle of their brief climb, before starting their long plummet to the Gulf of Mexico.

Wow, ain't it strange that ...

... doomcasters keep shouting the end of the world? From Ragnarok to Armageddon, was there ever a time without Jeremiahs, Jonahs, and Johns, clamoring some imminent last day? The long list makes you say *Wow*—

* * *

—*ain't it strange that* millenarians kept expecting the second coming every year of the first century C.E.? Or that twenty thousand “Old Believers” in Russia burned themselves alive, to escape the Antichrist? Or that the most popular book of the 1790s ingeniously tied every line of Revelation to Napoleon and other current figures, a feat of pattern-seeking that’s been repeated every generation since? Like when both sides of the U.S. Civil War saw their rivals as *the Beast*. Later mystics ascribed that role to the Soviet Union, then blithely reassigned it to militant Islam, then to the rising empire of the Han ... and now to *artificial reality* and the so-called Tenth Estate.

Can anyone doubt the agility of human imagination?

Nor is it always religion. Comets and planet alignments sent people scooting to caves or hilltops in 1186, 1524, 1736, 1794, 1919, 1960, 1982, 2011, 2012, 2014, 2020, and so on. Meanwhile obsessive scribblers seek happy closure in Bible codes and permutations of 666, 1260, or 1,000. And temporal hypochondriacs keep seeing themselves in the vague, Rorschach mirror of Nostradamus.

* * *

And wow, ain't it strange that ... computers didn't stop in 2000, nor jets tumble from the sky. Remember 2012's Mayan calendar fizzle? Or when Comet Bui-Buri convinced millions to *buy* gas masks and *bury* time capsules? Or when that amalgam of true believers built their *Third Temple* in Jerusalem, sacrificed some goats, then walked naked to Meggido? Or when the New Egyptian Reconstructionalists foresaw completion of a full, 1,460-year Sophic Cycle after the birth of Muhammad? Or the *monthly* panics from 2027 to 2036, depending on your calculation for the two thousandth Easter?

... or other false alarms, from the green epiphany of Gaia to the Yellowstone Scare, to Awwfulday's horror. Will we ever exhaust the rich supply of dooms?

* * *

And wow, ain't it strange that ... people who know nothing of Isaac Newton the physicist now cite his *biblical forecast* that the end might come in 2060? (Except Newton himself didn't believe it.)

* * *

And *WAIST* ... humanity survived at all, with so many rubbing their hands, hoping we'll fail?

Or that some of us keep offering *wagers*? Asking doomlovers to back up their next forecast with confidence, courage, and honest *cash*? Oh, but they-of-little-faith never accept. Refusing to bet, they hold on, like iron, to their money.

3. SKY LIGHT

A microtyphoon—a brief howl of horizontal rain—blew in from the Catalina Vortex before dawn. Hours later, pavements glistened as pedestrians stepped over detritus—mostly seaweed, plus a unlucky fish or two that got sucked into the funnel. The usual stuff. None of the boats or surfers the gloomcasters expected, when the phenomenon began.

Folks will say anything for ratings. Pessimists keep overplaying the bumper effects of climate change without mentioning anything good. Tor sniffed, relishing a fresh, almost electric breeze washed clean of pollutants from Old Town.

Others felt it, too. Her VR spectacles, tuned to track overt biosigns, accentuated the flush tones of people passing by. Grinning street vendors stepped out from their stalls, murmuring in a dozen refugee tongues—Russian, Farsi, Polish. When they saw that she didn't understand—her translator earpiece hung detached—they switched to gestures. One portly shopkeeper used theatrical flourishes like a stage magician materializing bouquets of imaginary flowers, all to draw her glance toward a patch of open space, his virtisement display.

But Tor wasn't shopping. Her eyes flick-examined several overlayers, trolling for correlations and news stories at street level. Once a pastime that became a vocation, till her cred scores vaulted over all the hungry amateurs and semipros out there, scratching to be noticed. *No more of that for me.* Now it would be office towers and arranged interviews. Politicians. Celebrities. Enovators. Luminatis. All sorts of newlites, no flashpans or sugarcoat surrogates.

All because I sniffed some clues and called a posse. Burst a local scandal that went global farky ways. Till MediaCorp called—said I'm ready for center-frame!

Plenty more hot stories loomed—like signs of fresh volcanism in Wyoming. Or the drowning in South Carolina. (Were corrupt seawall contractors to blame?) Or Senator Crandall Strong's craze rant during yesterday's campaign stop.

Why don't the media mavens unleash their new aice reporter on stuff like that, instead of sending me on an extended "human interest" tour? Could they still be unsure of me?

No. Don't go there. One thing the public valued more than veracity, Tor knew, was confidence. Assume you're worthy. Take it for granted.

Still, with her bags stowed for stage one of her trip across the continent, Tor hankered to prove the walks and spider-bridges one last time. Scanning Sandego—the Big S—for something newsworthy. A story in-pocket before starting her roundabout journey to Rebuilt Washington. A distraction, to avoid chewing active elements off her manicure till the embarkation whistle blew—throaty moan beckoning passengers to board the ponderously graceful skyship *Alberto Santo Dumont*.

The store owners soon realized that Tor had her specs tuned to omit adverts. Still, they grinned as she passed, crooning compliments in pan-Slavic or Tagalog or broken English.

Tor couldn't help doing a quick self-checkout, murmuring, "tsoosu." Subvocal sensors in her collar translated—*To See Ourselves as Others See Us*—and the inner surface of her specs lit with glimpse-views of *her*, from several angles, crowding the periphery of her percept, without blocking

the center view Tor needed to walk safely.

~~One image—from a pennycamera someone stuck high on a lamppost—looked down at a leggy brunette walking by, her long dark hair streaked with tendrils of ever-changing color: the active-stranger detectors and aware that Tor could deploy if something newsworthy happened.~~

Another tsoosu-vista showed her from ground level, smiling now as she passed a kiosk selling gel-kitties (*good as mouse catchers, good to play with, good to eat, Humane Society approved, twelve flavors*). This image evidently came from the shop owner's specs, watching her pass by. It started with Tor's oval face, lingered briefly over her white smile, then caressed downward, appreciating every curve, even as she strolled away.

Well, it's nice to be noticed, in a friendly way. Would she have chosen to be in News, if it didn't involve admiration? Even nowadays, when a person's looks were subject to budget and taste, it felt good to make heads turn.

Anyway, Tor was depriving no one, by moving away. Ever since Awfulday hit Sandego and a dozen other cities, more gen-bees and immigrants flooded in. Exiles who didn't mind radioactivity had a tad above background—not when compensated by sun, surf, and exciting weather that sometimes dropped fish out of the sky. Throw in bargain-rate housing. It beat watching snowdrifts grow in the glaciers outside Helsinki or Warsaw, or sand dunes cover sucked-dry oil wells in the Near East.

Enough narcissism. She click-erased the tsoosu-views, accessing other eyes. First a satellite down-pic of this area, with the *Alberto Santos-Dumont* bobbing huge at the nearby zep port. Arsenals and ships at the nearby Shelter Island Naval Base appeared fuzzy, according to security protocols. Though you could zoom the vessels from 3,470,513 other points of view that HomSecur didn't control.

One of those POVs—a cam stuck high above the chewing gum—won a brief auto-auction to send her a panorama, stretching from bay to marketplace, for five milli-cents. Remarkable only because her stringer-ai was programmed to inform her when pic prices hit a new low. Omnipresence spread as the lenses bred and proliferated like insects.

All this camera overlap changed news biz, as lying became damn near impossible. *The next generation will take it for granted*, Tor pondered. But at twenty-eight, she recalled when people tried every trick to fabricate images and fancy POV-deceits, faking events and alibis—scams made impractical by the modern solution of *more witnesses*. Or so went the latest truism.

Tor distrusted truisms. *Optimists keep forecasting that more information will make us wise. More willing to accept when facts prove us wrong. But so far, all it's done is stoke indignation and rage. As Senator Strong illustrated, yesterday.*

Another truism came to mind.

You screen,
I screen
We all screen
For my scream.

Immigrants stirred things—the Big S music scene was *raki* and manic arts flourished, encouraged by a faint glow surrounding old downtown at night—if you set your specs to notice beta rays. Even in the morning on the quay was lively as three sailors haggled with a smoke artist whose delicate portraits couldn't be reproduced by nanofax or shipped by omail. They forked over cash and watched her puff gel-hookah, adding clots of fast-congealing haze. A cloudy caricature of fresh-faced young Nav

chaps took shape while onlookers sighed.

It made Tor think of Wesley, though *his* air-sculpts dealt with surf and waves and rising tide. Adamant forces, implacably changing the world. And cued by her subvocal thoughts, a pict image of him played in the upper left part of her percept, recorded by her specs just a few hours ago—shaggy blond hair sodden as they rushed to escape the horizontal storm. Laughing, but with tension, a gu between them. The dilemma of a long-distance relationship unresolved—and likely never to be.

The lovemaking that followed had been more intense—and tense—than ever, with a clutching fury of knowing it could be the last ... till one of them improbably relented.

Tor shook herself. This wasn't like her—moodily strolling instead of s-trolling. Contemplating, not templating to amuse her fans. Musing, instead of sifting for stories along her beat, the ten million blocks of Camino Unreal.

Every cubic centimeter above these sidewalks swarmed with position-tagged information notifications and animations that existed only on the high planes of IP9 cyberspace. Viewing the world through some virt overlays, you might see the city transformed into fairy-tale castles with leering gargoyles lining the roofs. Or everyone overpainted with cartoon mustaches. On one coded level, a clothing would magically seem to vanish, replaced by simulated flesh, while supplying unsuspecting pedestrians with exaggerated “enhancements,” all by the design of some prurient little snot. On another, Post-it tags reported tattletale rumors about any person who walked by—a rich source of leads, if you had good ai to sift out swill and slander.

Anyway, who had time for kid stuff? Tor's ersatz reality-stack was practical, concentrating on essentials—the world's second stratum of texture, as important now as the scent of food and water might have been to distant ancestors. The modern equivalents to a twig cracking. Hints of predator and prey.

Tor paused at a shop selling vat-grown walking sticks—these could perform a variety of striding and even break into a jog. An out-of-towner—you could tell because he wore lead-lined underwe here in Sandego—haggled over a bulk order. “For my sister's store in Delhi,” said the tourist, unaware that metal briefs altered the display pattern of his pixel-fiber jumpsuit, making him a potbellied satire of Superman. Underpants on the outside. Wagging fingers and clicking teeth, the shopkeeper quickly scanned the sister's business and credit, then offered his hand. “I'll ship in ten days.”

The men shook. Their specs recorded. As in villages of old, *reputation* mattered more than an contract. Only this “village” spanned a globe.

There are times when it's too big. Like when two ambitious people want to remain close, while chasing separate ambitions a continent apart.

Soon after the lovemaking, Wesley offered a solution—swapping remote-controlled sexbots—to be with each other by *proxy*, across thousands of kilometers. Tor called it a rotten joke and said he should not come to see her off ... and he agreed, with a readiness that stung.

Should I call? Say to come, after all? Lifting a hand, she prepared to twiddle his code ...
... as a low whistle made the smoke sculptures quiver, beckoning from the Lindbergh-Ruta Skydock. *Boarding call*, she realized. *Too late*. Tor sighed, then turned to go.

Her reaction to the whistle did not go unnoticed. One nearby vendor tapped his specs, smiled and bowed. “Bon voyage, Miss Tor,” he said, in a thick Yemeni accent. He must have scan-correlated found her on the *Santos-Dumont* passenger list and noted her modest local fame. Another shopkeeper grinning, pressed a cluster of fresh flowers into her hand as she passed.

A ripple of e-lerts flowed just ahead of Tor—like fluttering glow-moths—and she found herself walking along a corridor of evanescent goodwill, arms filling with small, impulsive gifts and her ea

with benedictions in a dozen languages. Half buoyed by a wave of sentiment for the town she was leaving behind, she made her way toward the terminal where a mighty zeppelin strained skyward.

Tor—despite the perceptiveness of all her surrogate guardians—never realized that she was being followed all that time. Indeed, there was no reason that she should. For it was a *ghost* that made its way close behind, stalking her through familiar, neighborly paths of a global village.

But outside the village ... beyond its forest of tame overlays ... murmured a jungle that human natural eyes could never see.

ENTROPY

Way back, about a century ago, physicist Enrico Fermi and his colleagues, taking a lunch break from the Manhattan Project, found themselves discussing life in the cosmos. Some younger scientists claimed that amid trillions of stars there should be countless living worlds inhabited by intelligent races, far older than ours. How interesting the future might be, with others to talk to!

Fermi listened patiently, then asked: “So? *Shouldn’t we have heard their messages by now? Seen their great works? Or stumbled on residue of past visits? These wondrous others ... where are they?*”

His question has been called the Great Silence, the SETI Dilemma or Fermi Paradox. And enthusiasts keep scanning the sky, the galaxy’s eerie hush grows more alarming.

Astronomers now use planet-hunting telescopes to estimate how many stars have companion worlds with molten water, and how often that leads to life. Others cogently guess what fraction of those Life Worlds develop technological beings. And what portion of *those* will either travel or transmit messages. Most conclude—we *shouldn’t* be alone. Yet, silence reigns.

Eventually it sank in—this wasn’t just theoretical. Something must be *suppressing the outcome*. Some “filter” may winnow the number of sapient races, low enough to explain our apparent isolation. Our loneliness.

Over ten dozen pat “explanations for the Great Silence” have been offered. Some claim that our lush planet is unique. (And, so far, nothing like Earth has been found, though life certainly exists elsewhere.) Or that most eco-worlds suffer more lethal accidents—like the one that killed the dinosaurs—than Earth has.

Might human sapience be a fluke? Evolutionary biologist Ernst Mayr said—“Nothing demonstrates the improbability of high intelligence better than the fifty billion earthly species that failed to achieve it.” Or else, Earth may have some unique trait, rare elsewhere, that helped humans move from mere intelligence to brilliance at technology.

Sound gloomy? These are the *optimistic* explanations! They suggest the “great filter”—whatever’s kept the numbers down—lies *behind* us. Not ahead.

But what if life-bearing planets turn out to be common and intelligence arises frequently? Then the filter lies ahead. Perhaps some mistake that all sapient races make. Or several. A minefield of potential ways to fail. Each time we face some worrisome step along our road, from avoiding nuclear war to becoming skilled planetary managers, to genetic engineering, artificial intelligence, and so on—we must ask: “Is this it? The Big Blunder? The trap underlying Fermi’s question?”

That’s the context of our story. The specter at our banquet, slinking between reflection and foresight, as we turn now to examine a long list of threats to our existence.

Those we can see.

—*Pandora's Cornucop*

4.

RESURRECTED CITY

Stepping off the monorail platform, Hamish realized—the U.S. Senate Franken Office Building was a behemoth. One of those gargantuan monuments built in patriotic frenzy by the Post-Awfulday Project even before radiation counts fell to a safe level. Massive structures, expressing a national sense of utter (some might say maniacal) determination to reclaim the nation's capital, with an architectural style that seemed at once boldly resolute ...

... yet at the same time *hypercautious*, to a degree Hamish found delightfully paranoid.

Naturally, Hamish compared the Franken to something out of his own novels and films—a self-contained city, perched above the still-slightly-glowing soil on fifty gigantic pillars. Each could drop two senators—plus visitors and staff—to underground shelter in less than a minute. (Twelve more senators, from junior states, had to settle for offices in the less lavish Fey-Beck Building, just outside the safe zone.) Suspended in space between each pair of mighty cylinders, office blocks could be hermetically isolated—symbolizing the way some of the “united” states had begun insulating from each other.

A tall, grassy berm surrounded the complex, within a gleaming moat (“reflecting pool”), in a palatial style copied by dozens of other PAP buildings, giving Washington a deceptively parklike ambience—pastoral, riparian, hilly—that invited the eye, though picnickers were rare. All of it was watched by gleaming surveillance globes, atop discreet hatches that could disgorge men and dead machines at a moment's notice.

Hamish swept his gaze from the gleaming Capitol dome across other neomodern structures, each hunkering behind earth and jutting skyward at the same time, part bunker, part antiflood levee, and part spectacle—every castle complete with defiant, waving pennants. *A blend of Disney and Blade Runner*, Hamish decided. A uniquely American answer to the challenge of Awfulday.

Tourists, lobbyists, and staffers cruised among the Franken's fifty broad pillars, arrayed like stars of the flag. Some used glide-shoes or skutrs to hasten about. Older folk, in need of something to hold on to, rode Sallies or Segways. A few preferred old-fashioned walking, despite daunting distances. Shimmering heat waves played optical tricks with the grid of sunlit pavement and shadows, making the far seem near, and vice versa ... till Hamish's smart goggles compensated, restoring perspective.

Too bad—the effect had been kinda cool. Like in that movie they made of *The Killer Memes* ... even if the pigheaded director got the plot all wrong.

For the most part, Hamish didn't like to wear specs, except when he needed help getting from one place to another. Still, they offered enticing powers.

Wiggles spoke. From Hamish's left earring.

“*Senator Strong expects you in his office four minutes from now. We must pick up the pace, in order to be on time.*”

Hamish nodded out of habit. His old assistant used to require spoken commands or overt body cues. This new one sensed nerve signals and mutterings that he *almost* said aloud.

“Who cares?” he undermurmured. “Strong is as weak as a kitten, right now. Everyone's snubbing him, after those loony rants two days ago. And on the record, no less.”

The aissistant wasn't a full-fledged ai. Still, Wiggles acted a lot like one.

~~“That is no reason to mistreat a patron. I am overriding the skutr. Brace yourself.”~~

Hamish had only a moment to bend his knees and tense before the flat surface under his feet tilted slightly, accelerating on rapid-spinning wheels—all that a skutr had in common with the ancestral skateboard. Leaning forward, he soon found himself swooping past one of the five mammoth entry towers. COLORADO blazoned a banner carved out of native marble, above a frieze depicting the Second Capitol dome nestled amid lofty peaks, proclaiming the Rocky Mountain State to be America's “backup headquarters.”

Another broad cylinder, fast approaching, heralded NORTH CAROLINA across a huge lintel, showing the Wright brothers flyer in etched relief. Hamish gave up trying to steer the skutr, since Wiggles seemed insistent on maintaining control at this speed. Probably a good thing. The little vehicle automatically evaded slower pedestrians by swinging onto one of the fast-transit arcs that normally were used by messengers and delivery boys, hurrying across the expanse of pavement. So much for dignity.

“Brace for stop.”

Hamish briefly wondered what might happen if he disobeyed. Would the aissistant sense he wasn't ready and veer the skutr across the broad plaza, for a gentler deceleration? Or would Wiggles use the opportunity to teach its human a lesson?

No point testing it. He clenched his long legs. The skutr swerved and did a ski-style, sideways halt—barely legal—just short of a wide portico that proclaimed SOUTH DAKOTA—underneath a braided aluminum and gold sculpture of Crazy Horse.

Even with computerized help, Hamish thought it came across pretty cool, for a guy over fifty. Too bad there weren't any teens or tweens in sight, just lobbyists and such. Several glared at him, making Hamish feel young. But Wiggles chided—“*You need practice*”—as the skutr's wheels lost their charge and collapsed back into his briefcase. Its handle rose to meet his grip.

Of course, a few bystanders performed double takes, recognizing him and consulting their lenses to be sure. But his top-level caption said *No Autographs Today*, so no one approached. Of course, that saddened a part of Hamish.

He turned to enter the vast, circular lobby lined with shimmering pyrocrete, made from the same Yellowstone ash that drove out most white residents of the Dakotas, twenty years ago, leaving some First Nation peoples masters of their own state. Well, someone always benefits, even from a brusque with global disaster....

Wiggles interrupted.

“*The express escalator is to your right. You are already late.*”

To which, Hamish muttered, “Nag, nag.”

This time, the aissistant kept silent.

INTERLIDOLUDE

How to keep 'em loyal? The clever machines and software agents who gush 'n' splash across a twenty-three Internets? The ais and eairs who watch and listen to everything we type, utter, scribble, twut ... or even think?

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