Spaceland Notes

Notes written by Rudy Rucker for *Spaceland* (Tor Books, 2002).

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Writing Journal

January 7, 2000. Preliminary Plans for my Next Novel.

I'm writing this in my notebook on the island of Cozumel, in the state of Quintana Roo. Quintana Roo is abbreviated Q. Roo. That's me.

Today I was out on a scuba dive. I was thinking about my novel after *Bruegel*. The big effect is being in hyperspace. Things look like the sponges, corals, invertebrates. I've often had this thought before. The book will be a "crossover" type SF book. Light on the tech, big on the wonder, plot, characterization. My role model is *Being John Malkovich*. The fourth dimension is the one big effect and things come off of that. Write in first person p.o.v. (to make it easy to write), have it be maybe a Silicon Valley middle-manager. Present tense? I'd like to do that for once. An average Joe. In fact call him Joe. He has some hackers working for him. He can almost understand them, now and then. "Can you explain chaos to me one more time?" He has a pointy-haired boss like Dilbert. Give the boss some bogus biz lingo: "walk the walk," "the big cats are hunting," etc. Of course some of the programmers view our hero as a pointy-haired boss himself. Call the main hacker Scot. Or no, call him Spazz.

Starts with a 4D Pac-Man game. VR 4D lets you get unstuck and then you start to do it yourself. Or no, don't assume 4D or people are confused. Start with a special kind of 3D TV broadcasting.

He can't decide whether to marry. His girlfriend is — artist? — business dynamo? He loses her to the Spazz the hacker! At first she's disgusted by the hacker (cf. tidy Carole Fowler and my fellow math grad-student David Slater's fingernails). Call her

Carole. Or no, use Jena, it's more modern. At the end Joe doesn't get Jena back, instead he gets a new girl. In fact he gets Spazz-the-hacker's girl, an Indian girl called Tulip.

Love Story 4D.

(Joe + Jena) & (Spazz + Tulip)

(Joe) & (Spazz + Jena + Tulip)

(Joe + Tulip) & (Spazz + Jena)

(Joe + Tulip) & (Spazz) & (Jena)

"Drunker than six Texans at a Cancún Hora Feliz."

More thoughts about mainstream SF books: the book where the guy travels back in time to stop Reagan from being president. And there was a (non-H. G. Wells) *Invisible Man*. Nicolas Baker's, *The Fermata*. *Being John Malkovich*. In each of these there's a miraculous SF trick, but the trick has *no* impact or interaction with society at large. Society stays exactly the same. This is one reason why these books aren't true SF. SF tends to show a "future society" in which the gimmicks do change things. In the non-SF "wonder books," the gimmick is just that. A curio, a bauble.

June 22, 2000. Brussels, Hypercube on TV.

On TV is one of those European variety shows at a nightclub. A man juggles a ten-foot wireframe cube of chrome pipe. Twirling it, stepping in and out of it. Attacked by a hypercube onstage.

June 28, 2000. Joe's view of Spazz. Joe's Redemption.

Seeing a photo of an athlete smiling. Usually you tend to imitate a smile, to internalize it, to empathize. But in this picture, I felt there was no human personality behind it. Only a bundle of ganglia the size of a lemon. Like the bared teeth of a resting dog or horse. Or a cringing one — but no, not cringing, no emotion to relate to at all, like the arrangement of a plant's petals. Joe Cube might view Spazz this way. In other words, this is a dumb guy's view of a smart guy.

Think of Updike writing about Rabbit Angstrom. What would it be like to be stupid? Limited? Unimaginative?

I'd like Joe to get a redemption or "recovery" in the sense of opening up and being less self-centered. I don't specifically want to have Joe have a substance-abuse problem and have an AA recovery, as I'd rather not have the so-often-treated-by-me addiction issue in the book. I want Joe to become less self-centered, less resentful.

Maybe the company he works for his called Kenco and his boss is Ken, maybe a Taiwanese dotcommer called Ken Wong.

June 30, 2000. Joe's Astral Body.

The Dublin National Library was wonderful. Sitting there my thoughts turned to Joe Hyperspace or, as I now think I'll call him, Joe Cube.

Suppose I made the book quite closely modeled on *Flatland*, to the point of starting it out on New Year's Eve 2000. Use our trip to SF that night as a model? No, better to have Joe a total gull of the Y2K panic, staying home, a sucker, the pawn of every passing media fad.

At first I'd thought of calling the book *Joe Hyperspace*. But if it's analogous to

Flatland, the title *Spaceland* would make more sense.

The National Library's reading room is a wonderful space, barrel-vaulted and the vault coffered, with the individual squares painted different shades of blue. I sit in this room thinking about hyperspace viewpoints. Outside of space, you could easily rotate and jump around. You could put your eye down next to anything. If you were slightly ana from space, you could see through things.

What "light" would you be seeing with? The ordinary light is limited to space, it doesn't leak out into hyperspace. You would have to use some Higher-D light that the Spacelanders don't even notice. Call it Higher Light or Subtle Light. Might occasionally a photon of Subtle Light be diffused at an angle to stay in Space, giving the effect of energy creation? But would the Subtle Light interact with ordinary Spaceland matter? Maybe we do need to assume some Spaceland hyperthickness. We could wrap the hyperthickness Flat Torus style so as not to have to deal with a hyperskin.

Joe learns to see with Subtle Light. He becomes able to see ana the Spaceland objects. This could work if he has a greater than normal Spaceland hyperthickness. There could be layered upon his physical body and astral body which projects ana into the fourth dimension. In the same location as his normal eye is a Subtle Eye that is able to see down, at a very flat angle, onto Spaceland, thus seeing the insides of things, and seeing through things. Joe sees surfaces, but he sees innards as well.

Joe learns to flip himself over after awhile, and to jump. Note that if he flips, the astral body is the one in our Space and the physical body is the one sticking ana into hyperspace. When flipped he might well look ethereal.

Chapters: Joe Meets Momo, Journey to Hyperspace, Joe's Astral Body, He Flips, He Learns to Jump.

I might use the gimmick of presenting the book as a manuscript entrusted to me, and then I could have Notes and Drawings.

Joe's favorite bands are Dokken and the Melvins.

July 5, 2000. The cliff at the end of Sheepshead peninsula.

Hiking today on Sheepshead peninsula, one of the fingers sticking out of the southwest of Ireland.

Looking at the section map. The peninsulas and islands. If land is a fractal, why not space?

I was sitting at the edge of a 500 foot sheer stone cliff carved out of the land by the beating surf, looking down at the seagulls gliding.

How a height like this always draws me forward, what a longing to die, the rapture of the fall. Sublimated into a deep desire to fly. But I wouldn't fly, and oh how it would hurt to smash against that first jutting rock, and to tumble on down, breaking.

Could Joe Hyperspace survive if he jumped off a cliff? Just before the moment of impact, he could hyperjump and slide parallel to Spaceland. But what about the velocity? (a) He keeps the velocity when he leave Spaceland, so is moving rapidly parallel to it, which means he moves on through the Earth or (b) He loses all Spaceland velocity when exiting, it does a Reset. This is a better option. Could be justified by Mach's principle whereby inertia is the effect of the total matter in Space, so if you leave space, you lose your inertia for that Space at least, so your velocity could go too. So, yes, if Joe leaves space he stops moving and then can pop back in with no velocity. Jump off the cliff, do a

jiggly-doo right before impact and you're the man.

July 8, 2000. The two plots.

Quote from paper, someone talking about Harry Potter: There are only two plots in literature: a person goes on a journey; a stranger comes to town.

I usually do the first, most of my books are about journeys. Spaceland will be too, but I could add an element of "stranger comes to town" by having Spazz the hacker not be there at the start. Joe laboriously hires him.

July 18, 2000. T-shirts.

Jim, a friend of Jon Pearce's, tells me he's been an engineer for 15 years and finally got a job in marketing instead. "I wanted to see what it was like to be the guy shitting on people. Giving the engineers T-shirts." The odd thing, he reports, is that the engineers actually *like* getting the T-shirts.

August 8, 2000. Hypervision.

I read Clifford Pickover's *Surfing Through Hyperspace* (see notes on the book below), and it got some thought going.

Say that I use the overbeings' words for the two new directions: klup and dron.

Joe Cube is hyperthick. He can see inside of other things. For this to work, the other things have to be less thick than he so that he can see klup over their 3D surface.

The way this works is that stacked klup above his regular 3D eye are a series of extra eyes, each with its own 2D retina. Each of the retinas images a different 2D X-section of our space. Taken together the stack is a 3D retina. By proper lensing, the 3D retina forms a 3D copy of a real world object, inside and out. The front of a person appears in his regular retina, the slice beneath their skin upon the next retina klup, and so on. The fence on the first retina and what's behind it on the retinas further klup.

Read that *Sci Am* article again. A problem: if Joe is thick in the klup/dron dimension, then his mass and weight will be much greater?

Let's say regular things have NO hyperthickness at all.

August 25, 2000. Started Writing.

Yesterday I wrote the first page and today I'm writing some more. It's going good, writing itself. I didn't yet work out the "treatment" of the plot as much as I wanted to, but I needed to get started on it. I didn't want the Fall semester to kick in without a live novel to be playing with. Something to love, something happy to think about. I *love* thinking about 4D vision.

September 12, 2000. Underway. Calvino quotes.

I feel like I'm well underway now. I have 15,000 words, maybe a sixth of the book. I emailed a note about it to my friend Don, and he was like "another book? Jeez." I emailed him this:

"In any case [after the *Software* movie stress], went back to the basics, to what makes me happy: what I am is a novelist, in particular an SF writer. Not trying to knock it outta the park this time, just writing it, it's going real easy. Kind of a riff off *Flatland*,

called *Spaceland*, set in Silicon Valley. Seeing your 'another?', Don, I thought of this phrase in Italo Calvino's *If On a Winter's Night a Traveler*. 'She said that...she feels the need to see someone who makes books the way a pumpkin vine makes pumpkins --- that's how she put it...' That's exactly the kind of writer I most enjoy being. Like Elmore Leonard or Phil Dick or even Updike, a book every year or two. Another pumpkin getting orange in the Fall sun. That's the ticket. Barry's that kind of painter, for that matter, growing them like a pumpkin vine grows pumpkins."

I love, that, *making books the way a pumpkin vine makes pumpkins*. Another quote from *If On a Winter's Night a Traveler*: "The novel I would most like to read at this moment...should have as its driving force only the desire to narrate, to pile stories upon stories, without trying to impose a philosophy of life on you, simply allowing you to observe its own growth, like a tree, an entangling, as of branches and leaves..." *The desire to narrate*, yes.

September 15, 2000. Four Chapters, and What Next?

Ok, now I have a shade over four chapters done. Joe won a million at blackjack in Vegas, saw Jena fucking Spazz, and has split up with her. The book's a fourth done. What do I do now? I really can't visualize Joe going on TV preaching about the fourth dimension.

What does Momo really want? That's what I don't know yet. Why would she want Joe to preach about the fourth dimension anyway. Why would she give a fuck. What would *I* want from Flatland, for instance? It's similar to the issue of Om in *Realware*, what would she want with us? Or the aliens in *Saucer Wisdom*. It would be a nice change if Momo really did want something specific from Joe.

Another tack. What are the big scenes I still want to do? I read some of *Gulliver's Travels* this summer. I liked the stuff about Gulliver being a pet at court in Brobdignag. I can see Joe being a pet in the land of the fourth dimension.

October 10, 2000. Coming Up with a Model. First Black Spot.

The last week or two I've been busting my head figuring out a good model for how it all works, the 4D vis-à-vis the 3D, the Kluppers vis-à-vis Spaceland, 4D vision, 4D mass and inertia, etc. I've been typing it all in, further down in the doc. This morning I even started doing some calculus, setting up a triple integral in spherical coordinates to try and evaluate the gravitational force felt by someone near an endless 4D hypersheet. Fun.

This weekend, I was talking to a guy in the Math department about my efforts, and he said something like, "Oh, fashioning a consistent model." And I thought, yeah, that's it, I need to get the full mental model so that everything fits. And it's not something I can really do before I start to write, as before I start I don't have the full set of requirements, and also I haven't yet bruised myself enough on the hundred wrong ideas to be able to see what the remaining correct notion might be. Sometimes you never do get a consistent model and you push on anyway, as in the worst of SF movie scripts. But it's hard to have the strength to continue without a clear picture in mind.

In any book any writer hits this stage, it isn't really about the science alone. There ought to be a word for it. When you've hammered your cantilevered platform of

sentences pretty far out off the edge of the cliff, and then you look down into the abyss and the timbers are creaking, and you're madly scrambling around bracing and adjusting lest the whole thing tumble down into destruction.

I feel like it happens twice in each book. Somewhere Sheckley talked about hitting the "Black Spot" in your story. I think that's a pretty good word for the first time, the Black Spot, because it's about being confused.

Maybe the first time could be called the Alpha, and the second time could be the Beta — taking the expressions from Software Engineering, where the Alpha is when you get the first fully working prototype and then see what features you can add, and the Beta is when you have the final feature set and now try and make the thing bug-free.

November 17, 2000 Sketch at Los Perros Roasting

Imagine this from the viewpoint of Joe Cube, try and notice what he would, think what he would. Transreal ventriloquism.

Smiling woman, plump features, Uggs boots, running in place a little to make a point, light orange Polar fleece shirt, her partner also in Uggs, jeans, sweatshirt, looks like a good guy, chin weak enough so I don't feel threatened. He makes a show of checking his watch when two of their friends come in, a small smile on his mouth then, always nice to get a smile from a face like that. Passing out, the woman in the orange Polar fleece glances at me, catches how hard I'm looking at her, and looks away, slightly disturbed.

Woman alone on a stool, blonde with a new model cell phone, large screen on it, gets no answer. Then later she's hooked up, talking about the job openings at a new company. On and on about it. But then I turn and she actually isn't on the phone, its just a monologue. Her partner wears a sweatshirt and running shorts, when they stand up she holds him an accordion file organizer filled with separate small folders.

Couple in identical blue and yellow biking jerseys, blue and yellow shoes, black spandex shorts, like they're on a team, "Voler" is the log on their shirts. They're talking to a table with three older guys, he's nodding like he knows what's going on, eyes calculating. Long straight nose, fine teeth, strong chin, I should have had the jaw surgery that my orthodontist wanted to do, a slant cut to slide my lower jaw forward so I'd look more ruling class. He has curly brown hair. A bit later he's hit his stride, he's holding forth, with the older guys listening to him. The girl silently gazing at him like a flower at the sun, now and then he says something to make the older guys laugh, then she ducks her head and looks openmouthed over at them, milking the moment.

A girl with a big slice-of-melon mouth, full-lipped, wearing a crop top that just shows a line of soft skin above her beltline, chatting up her rumpled boyfriend, the eternal come-on in her motions, the little adjustments of her head, the slight knee bends for emphasis. Oh, you little bud, in your tight pants, your ski-jump nose, your eyes bright and blank as buttons.

A dignified silver-haired guy in turtleneck and jeans, surely a CEO, I tried to imagine ever reaching that level of comfort in my own skin. I tried to image success. God know I had no role models in my own family. My father was practically a bum.

A nerd with pooched-out lips like Dilbert's co-worker Wally. That blank, willfully self-involved look.

Everyone dressed the same way, everyone in sports gear, sweatshirts, jeans.

But wait, here was a hugely fat woman, long waterfall of hair, surprisingly easy in her own skin, but so not-Los-Perros. Back in Colorado there were a lot more fat people.

A man eating a pita and reading the paper, innocently and unconcernedly chewing. Comfort.

Man in checked shirt and jeans, heavy newspaper under his arm, disturbed over the rocking of his table, gets up and moves. Cell phone on his belt.

Woman with a set half-smile on her face, as if to say that she and the world were both nice.

Woman fresh from jogging, hair stringy, chewing on a long biscotti, licking her thin lips.

The crappy pictures on the wall, like UNESCO greeting cards.

Later in the day at the Borders coffee-shop. A Chinese woman talking really loud on her cell phone. Long straight black hair, very tidy, the words rapid. A bit harsh-sounding. Two tidy little boys, no three, one of them brings his fold-up Razor scooter into the shop. The father in jeans and sweatshirt, it's all one big casual Friday on Sundays, everyone's one chance a week to wear their casual clothes.

A regular-looking mother and kid, the kid with long slicked back blonde hair, chewing some enormous wad of gum, wearing a nylon tanktop. His mother short curly blonde hair and one of those forgettable middle-aged middle-American faces, plain as a piecrust.

December 2, 2000. In Café Puccini in North Beach.

Reading *Caws and Casuistries* by Anselm Hollow this afternoon. He's good at stirring up the old "ontological wonder sickness." (James's or Russell's phrase?) What is it like to be alive? How does time feel? What is a mind? The minds outside walking by, carried in bone crania atop the bodies with their beating biped legs.

I walked a lot today. Alone, S. off shopping, I wanted an empty day. The beautiful matter of the City. Some bare pipes in the Vesuvio Bar's men's' room were particularly striking. I stopped in at Capps' Bar on Green Street as well — I remember working on a manuscript there years ago, when I was drinking. It was *Hollow Earth* or maybe *The Hacker and the Ants*. Today I've had a few pages of *Spaceland* with me, working on it off and on. I'm lucky to always have a manuscript. Easier to work in coffee shops than in bars now, though. The drunks at Capps' were telling jokes about priest playing golf. At least three jokes on this topic.

It would be nice to retire to SF soon. Would help to make more money off my books. It's been a few years since I went back to that intractable old problem of trying to think of a big-selling concept. Maybe a new agent would have an idea. That guy Brockman. This isn't a really pleasant thing to think about. The obvious idea: Fractal Reality. Been done so much, though. Let go. Let God.

I'm lonely.

December 3, 2000. Howl and a Sketch From Market Street.

We were in North Beach last week, and I was reading a book of reminiscences by Anselm Hollo. I bought it at City Lights. Anselm was talking about the first time he read Howl. And then I started thinking about *Howl* and my favorite line from Ginsberg's

Howl:

> "and who therefore ran though the icy streets obsessed with a sudden flash
> of the alchemy of the use of the ellipse the catalog the meter & the
> vibrating plane."

I've always loved this little list, making me-the-math/science-guy feel at home with Allen. Imagine my disappointment to see in his "final" 1986 version of Howl where it takes it all back and changes it to, *yawn*, "the ellipsis catalog a variable measure and the vibrating plane." How English Department, how boring. He claims he meant "ellipsis" all along, just had used the wrong work all these years, e.g. in his 1956 City Lights original and again in his Collected Poems edition of 1984, both of which have the line the way I like. Only in the last senile "final" version does he ruin it for me. I'd always imagined the "meter" like a Robert Williams Scientology e-meter standing on little legs and holding out 'trodes and with a face of a dial and needle.

I started trying to write a story based on this, centered on a street-scene I saw on Market Street. I don't know if I'll finish it. I was going to write it for a charity benefit anthology John Shirley's involved with, something to make money for crack mothers. Here's what I wrote. I kind of lost my momentum when I saw Allen's 1986 version. But I could just forget that and do it anyway.

The Use of the Ellipse the Catalog the Meter & the Vibrating Plane

"*Damn* this is good crack. How come nobody ever writes about how good crack is?"

"You don't smoke crack, old fool. That's a gum-stimulator you're holding, not a crack pipe."

"I'm gonna tell you a crack story anyhow. Something that happened to me today, Sunday, December 3, in the year Y-fuckin'-2K. I'm sitting on a door-step next to a crackhead woman at the Powell and Market cable car stop. Me there in my Saks corduroys and my shiny leather jacket, waiting for the cable car. Gray-haired and wearing a beret. It's a cold day and this stone door-step is the only spot with sun. I'm sitting there in the sun waiting for my wife to come out of Nordstrom's so we can ride back to North Beach. A festive lark. We're up in SF for the weekend."

"Who cares?"

"Let me tell my story. You'll care soon enough. There's this hobbling alky guy talking to the crackhead woman, a guy who moves like a broken toy, maybe he has an artificial leg. He's being real gentle with the crackhead woman. Commiserating with her. He's like, 'It's Sunday, sweetheart. I know that's hard to believe. I've lost a few days that way myself.' There's this admirable sense of warmth coming off him even though he's a guy I'd skirt around on the sidewalk. He's got this camaraderie going out to the woman. She's a black woman, maybe thirty years old, sturdy-looking, maybe only a year or two into her addiction. I'm wishing she could detox and get in a program."

"Were you using your gum-stimulator?"

"Naw, man, I was high on life. Taking things in. Experiencing the now. And standing right in front of me were two homeboys with low pants — they're as low as I've ever seen. The waists are literally at their knees. They could shit or piss without taking those pants off. The legs are like eighteen inches long. It's as if they were midgets. But they're not midgets, they're big strong guys. I'd almost like to ask them how the pants stay up; they have long coats and I can't quite see if there's suspenders as well as belts.

But I'm not gonna say anything. This spot I'm sitting on could be viewed as their turf, and they're being kind enough to ignore me. There's a looped line of tourists waiting for their turn to get on the Powell-Hyde cable car, and then there's the homies and then there's the sunny stone stoop with me and the crackhead woman. I'm enjoying the sun. An old homeless woman is playing Christmas carols on a keyboard on her lap, though there's no sound from the keyboard. Maybe it's just a piece of cardboard to give her confidence. She's singing the songs real loud and getting some money from the tourists. It's peaceful there in the sun. I'm zoned out. My wife's still not coming for awhile."

"You're high on life."

"It's the best, man. No rush to do anything. No need to score. A motion catches my eye and I see that one of the homeboys is manipulating a green nylon fanny pack that's on the sidewalk. He's moving it around with this short cane he's got. A cane like to match the length of his pants, maybe two or three feet long. I don't know how he got hold of the fanny pack. I assume it came off one of the tourists. The homies are like salmon fisherman standing by a salmon ladder, and this is a fish they've pulled out. The other fish aren't noticing though, they're calm as ever, inching forward in the line and getting on the street-cars. Evidently the green nylon fanny-pack fish has already been filleted, because the homie with the cane passes it over to the crackhead woman. She's got nothing, so he's giving her something. That flash of camaraderie again. The woman fumbles around the fanny-pack for awhile, getting it open, feeling inside it with her wooden fingers. I figure if there was anything valuable in there, the homie would have already gotten it. I don't watch her opening it very closely. It's just sad how wasted she is. For sure she's forgotten about it being Sunday already. She's losing days at a time, maybe even weeks."

"Is anything gonna happen in this story?"

"Exactly now is when it gets surreal. I'm looking across the street at Nordstrom's to see if my wife is coming, and then I hear this kind of xylophone chord next to me. And the crackhead woman is sitting up and she's pulling all this stuff out of the fanny-pack. It's like five circus clowns coming out of a suitcase. Big cartoony shapes with little arms and legs. There's an ellipse, a catalog, a meter and a vibrating plane. Their like dancing ring-around-the-rosy in a circle around the crackhead woman. And her face is like suddenly suffused with health and joy."

"How do you mean — an ellipse, a catalog, a meter and a vibrating plane?"

December 13, 2000. Trying to sell Spaceland.

Avon rejected SPACELAND! I can't believe it. The editor says the book is "too weird". Since when is that a problem? They did all the Wares, after all. Of course those were mostly bought before I got this new editor Diana Gill. She rejected SAUCER WISDOM and BRUEGEL too. The only thing of mine Diana ever bought was REALWARE, and I guess she sort of had to as it was in the series. But the sales of REALWARE haven't been all that great. So I don't think it would be wise to write another in the series anytime soon. If Avon didn't buy a hypothetical fifth *WARE, as they very well might not the way things are going, then it would be pretty much impossible to sell elsewhere. Maybe in ten years the time will be ripe for another WARE.

Meanwhile there's the matter of SPACELAND. Well, Susan Protter got in touch

with David Hartwell at Tor, who's still half-planning to make an offer on BRUEGEL, and Susan said he instantly "got" the idea of SPACELAND, and wanted to publish it right away, was sorry even that I'm not finished with it yet. So today I sent him a new version of the proposal along with chapters 1-8. Maybe he'll make me a two-book offer. That would be pretty cool. The Tor books are nice-looking and they get distributed and reviewed. And David Hartwell is a pleasant guy to work with, a man my age, literary and knowledgeable.

I wonder how much of an advance I can get.

This comes back to the thing I focused on so much in BRUEGEL, that for most artists or writers, it's a never-ending struggle to get their stuff marketed. Particularly if you're somewhat innovative.

I recently got from Australian critic Damien Broderick a book called *Transrealist Fiction* which takes it's title from my theorizing, and has its last chapter about me. The chapter also appeared as a long lead article in this month's *New York Review of Science Fiction*. It's nice to get so much attention, but I think it's kind of a damning-with-faint-praise piece. I'm having to work to get through my reactions to it, to process it and get it out of my head. I think his reservations had to do with my — oh, occasional haste and sloppiness, limited range of emotions and topics, dirtiness, and unsettlingly writing about getting sober.

Well, I'm still growing. And I do think that when I've been dead for twenty years I'll get some more respect.

December 15, 2000. Reading On the Road.

I keep thinking about *On the Road*, which I'm rereading this week. I got a copy at City Lights in SF last week. Oh, by the way, I finished that story called *A Use for the Ellipse the Catalog the Meter & the Vibrating Plane* yesterday, it was the first time I've just written for fun in such a long time. As opposed to grinding it out for the latest novel. Writing this story in an experimental, screwing-around, Sunday painter kind of vein. I sent it to this pro-bono charity-ball kind of anthology John Shirley's involved with, I guess I mentioned it before, it's called *Desperation Street*, the proceeds are to go to crack mothers. Anyway, the North Beach outing got me back into the Beats again, I guess. Thinking of Jack and Neal here alone in Tucson. This is a road trip modern style: you fly somewhere and rent a car. Not that you see all the good back road stuff, which is the real joy of a road trip.

Another thing that got me back to *On the Road* was having reread my own *Secret of Life* last week in a newly typed up version for an ebook from electricstory.com. I'd always fondly thought of *Secret* as my *Road*, though now, seeing them so contiguously, I really have to admit I don't hold a candle to Jack. I did what I did, that's enough, I don't need to go and pretend I did more. My routine of comparing the cyberpunks to the Beats — what a crock. Not that I disdain *Secret*, it has some great SF transreal twist to it. (Although the constant drinking did start to grate this time around.) But the main thing I'm thinking is that *Secret* has nothing like the complexity of characterization in *Road*. As I writer I'm more inner-directed, more self-centered, less generous and less lyrical than Jack. The way he describes the weather and the sky and the sunsets! And, most specifically, I don't have any character like Dean Moriarty that I delve into in such richness, and with whom "my" character has such a complex relationship.

So naturally my clever simian mind turns to thinking about how I might better ape the Master. Could I put a Dean Moriarty into Spaceland? Probably too late for that, though maybe something can be done with Wackle. A better move might be to really thicken and complexify Tulip. As a lifelong transrealist, I have this kind of blind spot about how to invent characters. It's painfully slow, like growing a body in a vat or something. So much more work than simply collaging in a real person. And I tend to not feel confident that I can invent enough tics and tricks to match the texture of reality. But I need to remember that it really doesn't take all that many actual words.

It's like in a painting, if someone just draws a red line across the top of a green meadow patch, the eye reads it as a lovely scattering of poppies in bloom (I recently saw this particular trick in a somewhat cheeser gallery in Los Gatos). A beginning painter might think, "God, I can never paint all those individual flowers in that meadow, I can't paint a blooming meadow at all." But then a skilled and crafty cheeser just wipes some stripes and dibs some dabs and the eye is satisfied. By the same token, I tend to be afraid to try and create characters out of whole cloth because of the staggering complexity of growing the fully convoluted brain in the jar, but in fact all I need is like fifty (at most) catch phrases and tropes to make the person seem fully rounded. Dean's "mad bony face." His "Yes" and "yas." Of course Dean was in fact collaged in, but one could, after all, invent such a character.

So, coming back to Tulip and, for that matter, Jena and Spazz and Joe, I should make up a list of like twenty things for each of them and keep using those things. To make them real. And I especially should do that for Bruegel and Williblad and Mayken and Ortelius when I go back to the rewrite. Assuming Hartwell buys it.

One of the good things about being alienated and alone in an anonymous hotel is that then I write in my journal. But that's enuff for tonite.

Oh, one last thought about *Road*. What if I did an SF novel that set out from the start to be an homage to *Road*? That might be fun. It could be a picaresque galaxy-hopping kind of thing. One thing that makes *Road* so rich is the truly tragic quality of Dean, the fact that he really is losing his mind over the course of the book. The kind of desperate downward spiral. The itchy fascination, too, of matching the characters to the transreal biographical individuals — that's one gimmick I picked up on for sure. But if I did my homage called, say, *Galactic Kicks*, this one would actually not be transreal, it would be a pure fabrication. A way to do a space opera thing, like I've never yet tried. "Oh the thinks that we thunk..."

Though, again, reading another page of *Road*, I see again how illusory is the idea of matching it.

Jack's describing sleeping in a cheap all-night movie theater in Detroit. "The people who were in that all-night movie were the end." I love that use of "the end." And then he talks about getting this repeated double bill deep into the mind from seeing it or sleeping through it N times, and says, "All my actions since then have been dictated automatically to my subconscious by this horrible osmotic experience."

But, speaking of trying to match, here he is talking about the pianist "God" Shearing coming onstage and playing part of a set, and leaving and another group of musicians is going to try to play after listening to Shearing where "everybody listened in awe and fright ... and the boys said 'There ain't nothin left after that.'"

"But the slender leader frowned. 'Let's blow anyway.'

"Something would come of it yet. There's always more, a little further — it never ends. They sought to find new phrases after Shearing's explorations; they tried hard. They writhed and twisted and blew. Every now and then a clear harmonic cry gave new suggestions of a tune that would someday be the only tune in the world and would raise men's souls to joy."

January 26, 2001. Home Stretch Uncertainty.

I'm almost on the home stretch now. 66,000 words in, and Joe's just about to find out that space is gonna POP! Lots of stuff to sort out, it's getting harder and harder with more and more balls in the air. Once I can wrap this next scene with the Pop up, I'm finally going to set off into Dronia which is the real invertebrate kingdom fourth dimension, more so than Klupdom's Victoriana. And I think I'll have a Wackle head growing on Joe's shoulder, I've always wanted to do a guy with a head on shoulder, I remember a mutant like that in some SF book I read as a kid, a fat woman with a baby's head on her shoulder, she was telepathic, I think. Maybe the Wackles are telepathic, too. Joe could get telepathy as the head is pushing up his bandage. There's supposed to be, I think, some literal Flatland hook-in as well, haven't prefigured that too well as I don't quite have the picture for it yet.

By the way, when I saw Hartwell in New York last week he said he'd probably buy *Spaceland* for Tor, I sent him a fresh copy and hope to hear from him soon.

February 9, 2001. Hitting the Wall. Second Black Spot.

Ok, now I've written all the chapters where I knew what was going to happen and I still have two or three to go. I just finished Chapter 11, where Jena's Mophone pops space.

Joe is about to set off into Dronia. He has a talking Wackle head grown onto his shoulder. What are some loose ends?

Momo kept insisting that the Wackles sneak into Klupdom to steal grolly. Was this a complete fabrication or is there some root fact? Surely the Wackles aren't completely innocent. There must be something sneaky they in fact want to do to Klupdom. What is it?

If Momo's only goal was to be able to bomb the Kluppers, why is this so? Why should she want to, really?

Why does the Empress of Klupdom value Spaceland?

The Wackles are anemones, what is their culture like? What are they after?

What are the other creatures in Dronia like? There should be another race, perhaps the other race look like flying saucers? Might the Klupper saucers be living beings themselves?

I'd like to use the idea of Joe falling off a building on Earth and being able to catch himself. Maybe he gets thrown out the window of a big office building in San Francisco. Of off the Golden Gate Bridge. Why would this happen? Maybe some unscrupulous and ignorant dot-commers have merged forces with Sante the gangster?

I have an idea of Joe coming back with the patch, and getting it in place, and then finding out that Spazz or Clement Treed turned the Mophones back on. So there's a final crisis.

I also have an idea of there being a different final crisis, a fight with the Kluppers. Some higher force flattens everyone down to Flatland to level the playing field.

Did Drabk send Joe the dream of Flatland? Is there perhaps, as I always like to imagine, a true Flatland somewhere around Los Perros, like maybe in the culvert under the freeway?

Shouldn't we have seen some factories in Klupdom?

Dronia is to be less technological. What is it like?

I feel so blank on this. "The anxiety of the goalie at the penalty kick." What if I never get an idea, what if I never finish this book. I better try and write something now. I'll write about the Wackle anemones.

March 5, 2001. It's Done.

So, ok, now it's done. I was thinking of having Joe leave Jena right till the last minute, but then I had a good week with Sylvia as I was finishing, and it made me sad to think of Joe and Jena breaking up. As I emailed my S'more chat group yesterday: "Closer than ever to the end of Spaceland, I can smell the blood of the stag crashing ahead of my through the thickets, almost time to bring the sucker down. I realized I was depressed the other day because I was going to have my hero leave his wife, it would be 'good' for him, but deep down it made me sad, so I think I'll have him be as stuck/rooted in his marriage as me."

I'd sent an electronic copy of Chaps 1-12 to Hartwell's assistant Moshe Feder last week as an attached file. Susan said he might read it before Hartwell ever got around to it. So today I sent Moshe the final chaps 13 & 14 and sent Hartwell the whole thing.

May 23, 2001. I Get an Offer!

On the novel front, I got offers today from David Hartwell for my BRUEGEL novel and for my new SF novel SPACELAND.

April 25, 2001. Asilomar. I do the drawings.

I'm back here at the Asilomar Microcomputer Conference, I think I first came here in 1988? And then came a few times more. Nerds talking about computer stuff. I gave a talk based on the drawings for *Spaceland* that I just finished this week. In fact I finished them so I'd have a talk. Scanned 'em into Powerpoint and used them as my slides. The Flatlanders came out very nicely, I have them long snouts that look kind of like duck beaks.

There's one last image of an augmented (slightly thickened) Flatlander holding together a hole in his space, grabbing it with his beak-mouth, with his hands and feet. I drew this one right after Susan Protter called to tell me the good news that Hartwell is buying *Spaceland* and *Bruegel* both. But the advance wasn't quite what I'd hoped. So I felt a bit anxious as well as elated, and captured this in the Flatlander trying to hold things together.

July 16, 2001. Final Edit Mailed In.

I just emailed in the final edit of the book. I found a goodly number of things to fix as well as the four or five things Hartwell pointed out. Made it smoother overall,

improved some scenes. A lot of the fixes had to do with places where I did some crude characterization at one point by searching for every instance of “Tulip” and mentioning at that spot how she “crimped the corners of her mouth.” Reading it through all at once was a good idea.

While I was at it, I took out the "fucks", "shits", and bits of graphic sex, which weren't really necessary, and which might have stood in the way of teachers telling their students to read it. I don’t, after all, have such a need to be a bad boy anymore.

I added a sentence Walker had suggested to the last paragraph, but rereading it right after I sent it in, I realize it messed up the rhythm, damn, well I can still patch that in copy-edit.

It’s quite moving at the end. And its funny and has good science and the plot cooks right along. The only dull patches are when I start grappling with trying to describe how things look in hyperspace, but those attempts are, I think, important and original enough to leave in.

Word Count

Date	Word Count	Days In	Recent Words/ Day	Avg Words/ Day	Recent Days To Finish	Avg Days To Finish
Aug 25, 00	1850	1	1850	1850	47.65	47.65
Aug 26, 00	3123	2	1273	1561.5	68.25	55.64
Aug 31 00	6127	7	600.8	875.29	139.6	95.82
Sept 6, 00	14241	13	1159.14	1017.21	65.36	74.48
Sept 14, 00	21939	21	962.25	1044.71	70.73	65.15
Sept 21, 00	23900	28	280.14	853.57	235.95	77.44
Sept 28, 00	28064	35	594.86	801.83	104.12	77.24
Oct 3, 00	29656	40	318.4	741.4	189.52	81.39
Oct 19, 00	33413	56	234.81	596.66	283.58	94.84
Nov 2, 00	40124	70	479.36	573.2	104.05	87.01
Nov 15, 00	40661	83	41.31	489.89	1194.36	100.71
Nov 22, 00	44830	90	595.57	498.11	75.84	90.68
Dec 19, 00	50399	117	206.26	430.76	192	91.93
Jan 6, 01	60141	135	541.22	445.49	55.17	67.03
Jan 27, 01	67389	156	345.14	431.98	65.51	52.34
Feb 16, 01	78047	177	507.52	440.94	23.55	27.11
March 4, 01	89632	193	724.06	464.41	0.51	0.79
March 5, 01	90590	194	958	466.96	-0.62	-1.26

Lengths of my recent novels:
The Hacker And The Ants 92,000
Freeware 97,000
Saucer Wisdom 84,611
Realware 105, 351
Bruegel 107, 422

To start with, let's plan for *Spaceland* to be a shortish book and target it at 90,000 words. I'm hitting about five thousand words a chapter, so this would be eighteen chapters. Sixteen chapters would be a nicer number, as sixteen is two to the fourth power. Maybe some of the chapters could be a bit longer? The Klupdom chapter, for instance, is going to be long. Otherwise I could lower my sights to 80,000 words, though that's close to being short weight. (Though it'll bulk up in printed page count a little bit if I add figures, as I plan to do. *Saucer Wisdom* gained size this way.) But, really, it oughtta be 90,000 at least. So we'll count on some long chapters, don't feel like you have to bail out whenever you get to 15 pages, you can go for like 25 or 30 pages for some chapters. Don't rush yourself too much.

A structure I can see working is 4 Regular + Dream1 + 4 Regular + Dream2 + 4 Regular + Dream3 + L'Envoi. In other words 12 longish chapters and four shortish chapters, though L'Envoi could be normal length if there's enough things that I need to wrap up.

December 22, 2000. I'm thinking fifteen chapters. I have almost nine done at 54946 words. 54946/9 = 6105 words per chapter, so I get 85,500 words for 14 chapters or 91,500 words for 15 chapters. I'm shooting for 15. 9/15 is 3/5 or 60%.

December 31 2000. I'm thinking thirteen chapters, now with longer chapters at the end. I'm getting deeper and deeper breaths for these deep-into-the-song choruses. I have almost nine done chaps and will hit about 60000 words by the time I finish this long chap. 60000/9 = 6666 words per chapter, so I get 86,666 words for 13 chapters. That's not enough, but wait, if I make most of the coming chapters longer I can probably get up to 90,000. Chap 9 is already 9,600 words. 10 will be that long, 11 will be about .6 that long, and I expect chaps 12 and 13 to be as long as chap 9. So that would make 3.6 * 9,600 words to come, which is 34,500 more words. I currently have 58,882, so this would bring in a total of 93,382, which would be fine. I might actually split off a little short L'Envoi chapter from chapter 13 and have 14 chaps, but in terms of word count I can think of it as part of the 13. This feels good actually, as I don't see 13 being in and of itself that long. More of a 6,000 word chapter, and then 14 can be 3,000.

January 29, 2001. So now I have ten chapters done at 67,000 words. Despite what I said in the last paragraph, Chapter Ten was just standard length, 20 manuscript pages. Say I write four more, same length, I'll get 4*6,700 = 26,800, add this to 67,000 and get 93,800.

Feb 9, 2001. Eleven chapters done at 73,400 words.

Feb 21, 2001. Twelve chapters done at 78,705 words and 232 pages. That's 339 words a page. 6,558 words per chapter. To reach 90,000, I need 11,295 more words. That's 33 more pages. A seventeen and a sixteen page chapter would do it.

March 2, 2001. I fattened up some earlier stuff and finished Chapter 13, it's 15 pages. I have 85745, I could hit 90,000 in like 13 more pages! I might even run a few thousand over 90K. I *still* can't decide if Joe leaves Jena or not! I think he does.

Figures

I think it would be a shame not to put in a lot of figures, so as to enhance the comprehensibility. I don't think, for instance, that I ever would have understood Flatland (at least initially) if it hadn't had that classic picture of the sphere moving through the

plane.

But now, regarding the figures, who draws them? There are several options. (a) I almost think Joe can't draw them, as he's too stupid. Though maybe he could draw them at the end of the book. (b) I could draw them and say the book was a manuscript Joe gave me and I added the pictures. But this is a trick I've done twice before (*Hollow Earth* and *Saucer Wisdom*) and maybe it's tired. And if I do the "this is a true manuscript that I edited" routine, it limits the events to having to match our real world, in which case Joe doesn't get to go public in a big way, as it would be fun to have him do. (c) I can just draw them and stick them into the book and not make a fuss about who drew them. They can just be there as illustrations for the reader to feel smarter than Joe. This might be the best way.

Proposal

On November 13, 2000, I sent this summary off to Avon. They rejected it and on December 13, 2000, I sent one to David Hartwell at Tor.

Spaceland is set in contemporary Silicon Valley. The main scientific theme of the book is the fourth dimension; the title is a deliberate reference to Edwin Abbott Abbott's classic *Flatland*. The dramatic theme of the book has to do with a young managerial type waking up to the life around him in the process of losing his wife.

I plan for the book to be about 90,000 words long and to have fifteen chapters. I would also like to include a dozen or so simple line drawings of mine in the style of the drawings in *Saucer Wisdom*. The purpose of these would be to illustrate some of the four-dimensional concepts.

I've finished the first eight chapters now, which come to 48,000 words. I enclose a one-page summary of the book, a chapter-by-chapter outline , and a copy of the first eight chapters as currently written.

The manuscript should be completed by Spring of 2001. To be on the safe side, I would propose a delivery date of June 30, 2001, although if the manuscript were needed earlier, I could actually finish it by April 30, 2001.

Susan Protter will represent me for this book as usual.

Treatment

Now that I keep working on treatments for the *Software* film, it might be a nice idea to try and use these new skills to write a treatment for *Spaceland*. I have it in the form of a One-Page Summary.

One-Page Summary of Spaceland

(I) Joe Cube is a thirty-one-year-old low-level manager at a dotcom company in Silicon Valley. He is unhappily married to a woman named Jena. On New Year's Eve of 1999, Joe is contacted by an alien being from the fourth dimension.

The alien, whose name is Momo, "augments" Joe, adding some four-dimensional features to his body. Joe is now able to see through walls, and is able to peel himself up out of normal space, which Momo refers to as Spaceland.

Joe and Jena team up with Joe's co-worker Spazz and win a million dollars at blackjack, with Joe reading the cards by using his four-dimensional vision. But then Jena

starts a love affair with Spazz, and Joe and Jena split up. Joe is heartbroken.

(II) Momo takes Joe on a tour of her four-dimensional homeland of Klupdom. It seems that our universe, a.k.a. Spaceland, divides four-dimensional space into two distinct regions, inhabited by the Kluppers on the one side and the Dronners on the other.

Momo uses a small four-dimensional flying saucer for transport and takes Joe to a Klupper city. She gives Joe some higher dimensional wires that Joe is to use for antennas for a new kind of cell phone called the Mophone. It's not initially clear why she is doing this. Joe gets over Jena. He builds a Mophone with Spazz's ex-girlfriend Tulip. Spazz and Jena get involved as well. Momo continues visiting Joe, bringing him special four-dimensional food to keep his augmented body strong.

The Mophone is a success.

(III) A Dronner named Wackle kills Momo while she is visiting Joe. Joe gets control of Momo's flying saucer and parks it in his garage.

Joe learns that the Kluppers' real plan is to destroy Spaceland so that they can more readily shoot at the Dronners. The purpose of the Mophones is to weaken the fabric of our space so that sooner or later it will pop, and once a hole forms, our universe will break up like a pin-pricked bubble. Our space will tear through like a piece of mildewed canvas. Joe issues a recall of the Mophones. He also befriends the Dronners and tells them of the Kluppers' evil plan to destroy our Spaceland. The Dronners help Joe try and track down the few remaining Mophones before its too late.

Joe gets almost all of the phones shut down, but then Jena makes one last call — as the marketing vice-president of the Mophone company, she's been the biggest Mophone user of all. A sphere of space around Jena turns into Nothingness. Joe pushes Jena out of the way in time and throws himself into the breach. Thanks to being four-dimensionally augmented, he is able to grab onto the fabric of space and temporarily hold it together.

Meanwhile the Dronners appear and insert a spherical frame into our space to contain the damage — it's a bit like an embroidery hoop. Yet at the same time the Kluppers are trying to shoot the frame away. The Dronners hold them off, but the only long-term solution is to find a patch of space to sew into the hole.

Joe uses his flying saucer to set off into the higher dimensions beyond Dronia to find such a patch and, after some adventures, obtains one. A cosmic battle ensues.

At the end of the book, the universe has been saved, and Joe is a better man.

Chapters

Chapter 1: New Year's Eve

Joe is home with his wife Jena on the New Year's Eve of 1999, he's brought home the experimental 3Set from Kencom, a dotcom hardware company where he works as a manager, under a dotcommer boss named Ken Wang. Though Joe and Jena are newlyweds, it's an unhappy marriage. Joe is kind of a frozen, unresponsive person, and Jena bullies him. Joe and Jena go out to a bar and run into his co-worker Spazz and Spazz's girlfriend Tulip. Joe and Spazz are white guys, Spazz something of a hacker and a stoner and Joe is a business school graduate. Jena is half Yavapi Indian, but was raised by Norwegian ranchers and is a Californianized marketing manager. Tulip's parents are

from India, but she was raised in Silicon Valley and is a successful chip engineer. Jena gets drunk and goes to bed, Joe notices some odd pink globs in the 3Set.

Chapter 2: A Visitor from the Fourth Dimension

The pink globs come out of the 3Set. They're the fingertips of Momo, a four-dimensional woman. Momo tells Joe she wants to help him build some new technology to change the world in some initially ill-defined way. Momo refers to our world as Spaceland, and she refers to her four-dimensional world as the All. She speaks of the extra four-dimensional directions as "vout" and "vinn." These are purely spatial dimensions, and have nothing to do with the dimension of time. Joe is scared. Momo "augments" Joe, giving him some hyperthickness and a third eye that can see as if from the fourth dimension. The third eye can see inside things. Confused, Joe goes to bed with Jena and falls asleep.

Chapter 3: Momo's Cross-Sections

In the morning, Joe shows Jena his new power of "subtle vision." His invisible third eye gives him something like X-ray vision. Jena has the idea that Joe can use his third eye to win money at blackjack. They start off for Tahoe, but stop off at Kenco to return the 3Set. Spazz is there, and he flirts heavily with Jena. Momo appears and shows Joe, Jena, and Spazz the cross-sections she makes by moving through three-dimensional space. Momo steals some money from a nearby bank by reaching into the safe from the fourth dimension. She gives the money to Joe for use as his stake for gambling. Spazz teams up with them and Joe, Jena and Spazz fly to Vegas.

Chapter 4: Las Vegas

In the casino, Joe quarrels with Jena. Joe wins a million dollars at a casino and puts it in a briefcase. Joe has promised Jena that he'll give her half his winnings. Meanwhile back at the motel room, Jena is having sex with Spazz. Joe can see through the walls to witness this with his subtle vision. He's devastated. Momo appears and takes Joe home. Momo has a small metal flying saucer she rides on; they travel just next to Earth, parallel in the fourth dimension.

Chapter 5: A Dream of Flatland

This chapter models and prefigures some of the higher-dimensional things that are going to happen to Joe in the rest of the book.

Joe has mentioned earlier that when he was twelve, his mother stabbed his father in the stomach with a carving knife. This is one of the reasons he's somewhat unloving. Joe has a dream that mixes this traumatic memory in with a vision of a flat, two-dimensional world. In the dream he augments his flat Dad, by making him thick in the third dimension and giving him a stalk from his brain with a normal three-dimensional eye on it. A third eye. When Joe's flat Mom tries to stab his flat Dad, flat Dad saves himself by bulging up into the third dimension like a croquet wicket.

Joe lifts Dad into the third dimension and tries to show him our world. We go over flat Dad's bewilderment in learning to see in the third dimension, accustomed as he is to using a one-dimensional retina.

[I could add some of the following. We see Joe "mirror reverse" his Dad by turning him over. And then Joe convinces someone in the flat world that he's four different people by sticking his hands and feet into Flatland. Joe also notices that his augmented Dad is able to take hold of the space of the flat world and pull it about.]

Chapter 6: A Narrow Escape

Joe awakes to a cell phone call from Jena in Las Vegas. She wants to split up, and she tells Joe he has to move out. Joe acquiesces. Jena also tells Joe that some men from the casino are looking for him.

Momo appears and tells Joe that she has figured out the idea for the new technology Joe can build. They'll make a little bent antenna that shunts radio signals over into the fourth dimension to travel parallel to our space. The whiskers can also be used as receivers to pick up signals of this type. In this fashion, they'll solve the problem of there not being enough frequency bandwidth for cell phones (which happens to be a significant technological stumbling block as of the year 2000). The product will be called the Mophone. At this point it's not clear why Momo wants to do this for Joe, but he's very excited. He feels that marketing the antenna crystals for the Mophone will make him a wealthy dotcommer. Momo says she's going to go get her husband Voule to start making up some of the whiskers.

Joe quickly packs up and finds a house to rent, but when he tries to take the deposit money out of his briefcase there's nothing in there but a red devil-hand from the fourth dimension, taking his money and giving him the Finger. Two hoods from the casino appear and try to stab Joe, someone has told them that Joe used stolen money as his stake and that he cheated at the blackjack game. The same someone has been updating them by phone about where to find Joe. When Joe says he can't repay the hoods, they propose to stab him non-lethally in the stomach in order in impress upon make it clear that he has to pay. But Joe avoids getting stabbed by bulging his midsection up into the fourth dimension. Momo appears and chases the hoods away.

Chapter 7: Klupdom

With Momo's encouragement, Joe learns how to peel his whole body up into hyperspace. The hyperspace of the All is divided into two regions: Klupdom and Dronia, separated by the great hypersheet of Spaceland. We might think of Klupdom and Dronia as two enormous slabs with a kind of cavern or in between. A bit like a sandwich, with our world the ham between two four-dimensional slices of bread. The four-dimensional beings walk around on the outer hypersurfaces of these slabs, and Spaceland floats within the cavern in the middle, which Momo calls the Cave Between Worlds.

Momo's folk, called the Kluppers, live on the vouter surface of Klupdom, which is reached by traveling through some tunnels vout away from Spaceland and the Space Between the Worlds. They move about by riding on small flying saucers.

Momo says that on the other side of Spaceland — the vinner side — lies Dronia, inhabited by a folk called Dronners. The Kluppers hate them. It was a Dronner named Wackle who stole Joe's money. phoned the casino about Joe. Momo says she plans to kill Wackle, but Joe says he wants no part of a hyperspace war.

The walls of the great Cave Between Worlds are covered with a four-dimensional

plant called grolly. Joe eats some of it and feels greatly revivified. His enhanced four-dimensional body needs four-dimensional food.

Momo's family owns the grolly business, and they have armed guards patrolling the Cave Between Worlds to protect the plants. They worry particularly about Dronners sneaking up through Spaceland to steal grolly. There are also some soldiers of the Empress of Klupdom in the cave. Their main mission is to protect Spaceland, which the Empress deems sacred.

Joe learns to fly in the air of the Cave Between Worlds by flapping like a manta ray. Then Momo uses her saucer to take Joe hundreds of miles up through the tunnels to Klupdom proper. They go into a four-dimensional town called Grollyton and go to Momo's house. Meanwhile Joe is slowly learning how to use his third eye to see in the fourth dimension.

Momo's relatives tell him a bit more about their hatred of the Dronners; they're quite virulent and irrational on the topic. Momo's husband Voule gives Joe the special antenna crystals. Momo now explains that they expect for the extra radiation from the Mophones will repel the Dronners from crossing Spaceland near Earth, which also happens to be near the Momo family's grolly fields.

The Empress of Klupdom makes an appearance. Momo has told the Empress that Joe is a sorcerer whom Momo caught stealing grolly. The Empress forbids Joe to come out of Spaceland again, and says her guards will shoot him on sight. The guards have a kind of ray-gun, a hyperbazooka. The Empress also deputizes Momo to watch over Joe in case the Dronners try to harm him.

Momo ferries Joe back to Spaceland. All this time Joe has been thinking about Jena, and hoping they can get back together again. By the time they get back to Spaceland, Joe is all set to make up with Jena, and he asks Momo to swing by his house. But, looking down from the fourth dimension, he sees Jena in bed with Spazz. Momo sets him down in his car with his antenna crystals.

Chapter 8: A Date with Tulip

Joe does some soul-searching and undergoes something of a change in his personality. He decides to stop being passive and stop being a victim of Jena. He resolves to rid of his poor self-image that lets people walk all over him. As a result he opens up and becomes more appreciative of the richness of daily life. The fourth dimension has given him a new appreciation of things.

He decides to rob the bank. He doesn't want to flip vout into the Kluppers' half of the All, or he'll be shot. So he goes vinn into the Dronners' half, flaps to the bank, and fills up a special hypersack bag with money. While he's vinn below Spaceland he notes that the air has a different quality there, it's more like water. He looks over at the Dronian wall of the Cave Between Worlds, and it looks kind of like a tropical reef with things like enormous anemones growing on it.

Back in Spaceland, Joe puts the down payment on his rental office/house and incorporates Mophone, Inc. To celebrate, he gets Spazz's ex-girlfriend Tulip to have supper with him. Tulip is a process engineer. There is some slight possibility of romance; though to start with Joe and Tulip have a kidding relationship. Joe offers Tulip a large sum of money to get her to come work for Mophone, Inc., and she agrees to come help him the next morning. Joe doesn't tell Tulip where he's actually getting the antenna

crystals from.

After dinner, Joe decides to go get some more money out of the bank. But this time while he's vinn in hyperspace, something comes after him, a red devil-like figure seemingly attached to a long tendril from one of the distant anemones. Joe tumbles back down into Spaceland and drops his bag of cash on the main street of town. The devil thing is there trying to talk to him, it's Wackle. There's an incredible flash of light but no noise. Wackle is splattered. Momo has shot him with her hyperbazooka The money is blowing all over the place, Joe takes off running, turns a wrong corner, gets lost, realizes that he's been mirror-reversed, he came down flipped over, and the money is mirror-reversed as well. He finds his way home and goes to bed.

Chapter 9: Mophone, Inc.

In the morning, everything is still backwards. Food tastes wrong. Joe gets a paper and has to hold it up to the mirror to read it. There's a story about the mirror money in the street.

Tulip shows up to work on the Mophone, and doesn't really notice the difference in Joe. Joe sits at his kitchen table, playing with some cut-outs of paper shapes and figures out that he's really flipped over. He figures out that he has to go into hyperspace to turn over, and then he does it.

Tulip gets a pair of Mophones working. She agrees to work with Joe some more and to move into his extra room. She drives to her sister's in Fremont to get her stuff. She keeps calling while driving, and the Mophone keeps working over longer and longer distances. Joe feel wobbly. He could use some grolly. Tulip calls on the regular phone from Fremont, her Mophone has disappeared. And then Joe's Mophone rings. It's Jena!

Joe goes over to Jena's house. Momo has snuck and given Jena the second of the two Mophones that Tulip made. And in addition she's given Jena and Spazz a lot of the special antenna crystals as well. Jena and Spazz want to be in on Joe's new business. Especially since Joe lost the half-million he was supposed to give Jena. Momo is there. Momo says she wanted to be sure the product really got developed. Momo says Joe's accident serves him right for going into Dronia, she says he shouldn't ever go there and he shouldn't ever talk to Wackle. "But didn't you kill Wackle?" asks Joe. Momo says that he's not really dead. There are a lot of copies of Wackle. And then she gives Joe some grolly and he feels good again.

Another copy of Wackle approaches, and Momo leans below Spaceland to shoot it. Wackle is a kind of anemone, and each time Momo shot him she was only shooting a tip of one of his tendrils. Momo gives Joe some more grolly and leaves.

Joe gets kind of high on the grolly and agrees to let Spazz and Jena in on the company. They go to Joe's and talk it over with Tulip. They fax in resignations for their jobs and email requests for VC meets. When Spazz and Jena leave, Tulip goes to bed crying, bummed to be paired with Joe.

Fast forward through the next few days. They resign from their jobs, they file a patent application, they have some unsuccessful VC meetings, and then a successful one with Clement Tingle. In this final meeting, Momo pops out of a PowerPoint slide. They get the money. They celebrate. Tulip goes out with Spazz, she comes back late, all abuzz, with sperm inside her. Spazz is sleeping with both Tulip and Jena and Joe is sleeping with neither. Joe is out of grolly, and is uptight.

Joe loses it and decides to kill Spazz. He goes out into hyperspace and reaches in and takes hold of Spazz's aorta and squeezes it shut. But then the Dronner Wackle appears and questions what he's doing. The Dronners are in fact good. And now Joe realizes he doesn't want to be a killer. So he lets Spazz off the hook. Wackle reaches into Spazz's lungs and clears out the mucus to get rid of Spazz's cough. He can't reconcile Momo's hatred for the Dronners with how kindly and rationally Wackle spoke to him when he almost killed Spazz.

They get VC funding. They meet five guys, and the first four say no, and for the last one, Momo pops out of the PowerPoint slide and convinces Clement Tingle to fund them. Tingle knows about the flipped money, Momo agrees to turn it back and replace it in the box where Joe stole it. Clean start.

Chapter 10: Bad News

They ramp up into production bigtime and the Mophone is an instant hit. Jena is constantly on her cell phone making deals; Jena's phone by the way is now a Mophone. Momo keeps showing up with more antenna crystals.

But Joe is dependent upon Momo for the grolly, without he feels sick and weak. It's like an addiction. Momo is getting bossier and more demanding, pressing Joe to up the production. Because of his need for the grolly, Joe is working harder than the others, and Momo likes this. Joe is almost used to red devils popping up in front of him, always trying to talk to him, and then being blown away.

There's a party on a Saturday night to celebrate shipping the 100,000th Mophone. At the party Joe learns that Jena and Spazz have broken up. Jena's kind of flirting with Joe once again. But Joe's hardened his heart towards her, though at some level he wants to help her. Jena leaves the party alone. Joe starts to go after her, but Tulip calls him back. And then Tulip finally spends the night with Joe.

When Joe wakes up the next morning with Tulip, Momo appears with some more antenna crystals and some grolly. Tulip is disturbed. And now a whole room full of Wackles appear and manage to disarm Momo and drag her off into Dronia screaming horribly. Pieces of Momo's torn flesh drift through the room. Joe's on his own now, no more Momo watching over him. Tulip freaks out and runs away.

Jena calls; the Vegas gangster Sante has turned up again and is threatening her. Joe says she should come over.

Joe notices a piece of Momo's flying saucer sticking into his space, a warping cross section of metal. It's Momo's saucer. A Wackle says Joe can keep it for awhile and use it as his own, just as a gesture of good will. He says he better not let it stick out into the Kluppers' side. The Wackles and Joe drags the thing to the vinn side of the garage of his rented house and Joe anchors it there by tying it with a four-dimensional rope from the saucer, ties the saucer to a rafter of the garage, and leaves the saucer floating there.

One of the Wackles bites Joe on the shoulder and draws blood, implanting something.

Joe goes back into his house and Jena shows up. They do some work, getting ready for a meeting to hand off the technology to Clement Treed's company, MeYou. That afternoon, Joe gets desperate hungry for grolly. He decides to go for it, and he flies the saucer out into the Kluppers' part of the four-dimensional All, flies to the cliffs and

gathers pounds and pounds and pounds of grolly. Nobody bothers him, first because they recognize the saucer as Momo's and they don't know she's dead yet, and second because when a guard does come by, Joe turns sideways so they can't see him — like an angelfish. But then the guard does see him, and Joe flies home through Spaceland, circles back and parks the thing by his garage again. Joe has a four-dimensional flying saucer full of grolly in his garage!

When Joe goes back into his house, he gets high, and then he and Jena get into a fight. Deet shows up and starts fighting with Joe, hearing the trouble, Jena leaves.

Deet's another four-dimensional Klupper, Momo's son-in-law. Deet wants to know what happened to his mother-in-law. And how Joe got her saucer. The guards recognized Joe flying it. Joe says that Wackle killed Momo and that he was just saving the saucer for safe-keeping. Deet isn't all that upset about losing his mother-in-law. He demands the saucer back, but Joe says no. Joe says go vinn and get it from Wackle if you want it, but Deet is too scared of the Dronners. Deet loses his temper then and says it doesn't matter as Joe won't be around to bother them much longer. Deet goes ahead and tells Joe the real reason why Momo gave them the Mophone crystals.

The purpose of the Mophone is to sap energy from our space so that it wears thin and pops. Once a hole forms, it expands with the great rapidity. our universe will break up like a pin-pricked bubble.

Chapter 11: Pop!

The Wackles show up, hundreds of them, they've overheard the plan of the Dronners of the Kluppers' evil plan to destroy our whole world solely so that the Kluppers can have a free-fire zone in the Dronners' direction. They push up into Klupper space and start fighting with the Kluppers, to cover Joe while he tries to turn off all of the existing Mophones before the integrity of our space becomes so compromised that it rots away like mildewed canvas.

Joe gets Spazz on the phone, and Spazz tells him how to use the computer to shut almost all of the Mophones down, all of them but three: Spazz's, Joe's, and Jena's. Joe wants to call Jena, but Spazz says he'll do the call but can't reach Jena, her phone keeps being busy. He figures she's at the Los Perros Coffee Roasting Company.

Meanwhile the strands of the Wackles are wrecking Joe's house. Clement Treed and his team show up, Joe tells them the Mophones are off, Treed is upset.

Joe drives to the Roasting, and as Joe arrives Jena starts to make one last Mophone call. And that does it. A sphere of space around Jena turns into Nothingness.

In the nick of time, Joe leaps forward, pushing Jena out of the sphere of Nothingness. Thanks to being four-dimensionally augmented he is able to grab onto the fabric of space and temporarily hold the hole together.

A Wackle appears and helps Joe tie some hyper-ropes across the hole, temporarily holding it closed. He says Joe has to go find Drabk for a space patch. Meanwhile the Wackle-bite on Joe's shoulder has grown a little Wackle devil head that talks to Joe. Joe gets in his saucer — all the grolly is gone — and takes off for the reefy cliffs of Dronia, but not before kissing Jena goodbye.

Chapter 12: Dronia and Beyond

Joe sets off into Dronia to find a patch to fix space. It has to be different from how it was when he went up to Klupdom.

Some picaresque adventures.

The patch is with Drabk, a being who is a even beyond Dronian space, a five-dimensional being. Beyond the beyond. Joe has a cosmic vision of dimensionality.

Joe gets the patch and returns to Earth.

Chapter 13: The Battle of Flat Matthewsboro

The Kluppers and Dronners fight it out right on Earth, with Joe in the middle.

In the middle of the battle there's a bit where the dimensions collapse and Joe's truly down in Abbott's Flatland, like he dreamed about earlier in the book.

Joe does something there to save the universe.

Joe falls off a high building and uses 4D to save himself. Jena gets shot and Joe reaches into her body to fix her.

Chapter 14: Life Goes On

Preliminary sketch of Chapter 14. Some Wackles and Kluppers visit Joe in jail. The Kluppers are from the Empress, they're apologetic about what Momo's family tried to do. The many-branched Wackles undertake to find and remove all of the Mophone antenna crystals, it's a big job, but its easy enough if you're as fractal as the Wackles are.

This problem is solved, but Joe is tormented by worry about Sante hurting Jena. He's no longer augmented, and the jail really holds him. He calls out to Drabk, and has a vision of Drabk's face, appearing in the shadows on the cell wall. Drabk shows him a head-trick to temporarily augment himself and move vout over the jail cell walls.

Right outside the jail Joe bumps into none other than Sante, who'd come down to visit him. Seems Sante has (forged) lawyer's credentials, as he was planning to present himself as Joe's attorney. Joe says he doesn't have any million in cash, but offers Sante stock options and a job at Mophone. Sante goes for it. He lost his job at the casino. They go together to the Mophone board meeting at MeYou.

Joe announces that all the antenna crystals are gone, Spazz checks it out, it's true. But then Joe comes up with the idea that Mophone can still successfully stay in business and do their IPO; the no-server paradigm and Spazz's new Motalk software is in and of itself enough for a good value-added product. Clement Treed promises to get his lawyers to get Joe's case dropped today. He agrees to make Sante head of Customer Support.

Joe leaves the meeting with Jena and she drives him back to the jail. On the way they have a talk and their problems at first seem resolved, but then a fresh argument breaks out. Joe uses hyperspace to walk though the wall into his jail cell. Just as he sits down, a guard comes to tell him he's free. He walks outside. Jena is waiting in the parking-lot. He stands there, unsure of whether to go to her or to run the other way. End on this note of uncertainty.

Timeline

1968 Joe born in Littleton, Colorado.
1972 Jena born in Prescott, Arizona.

1990 Joe graduates from Colorado State U in Fort Collins with a degree in Business and a minor in Engineering. Jena graduates from high-school.
1990-1995 Joe works in a CompUSA computer store in Denver.
1995 Jena graduates from U of Colorado, with a BA in Communication.
1995-1999 Jena works for CompUSA in marketing, first in Prescott, then in Denver.
1995 Joe and Jena meet at the CompUSA store where they work.
1995-1999 Joe gets a slightly better job in human resources at a software company. Joe goes to U of Colorado in Boulder, gets an MS in Engineering Management. Jena takes some grad courses in marketing.
1996-1999 Joe and Jena live together.
1999 Joe and Jena get married, move to California.
Friday, December 31, 1999 Chapter One, they go to the Black Knight
Saturday, January 1, 2000. Joe meets Momo in the wee AM. They fly to Vegas.
Sunday, January 2, 2000. Joe see Jena fuck Spazz in the wee AM. He dreams of Flat Matthewsboro. He finds a house. Wackle steals his money. Momo takes him to Klupdom. He sees Jena and Spazz together in bed in the afternoon. He has dinner with Tulip. He robs the bank, Wackle attacks and he flips over.
Monday, January 3, 2000.
Joe gets turned over the right way again. Tulip invents the Mophone. Momo gives it to Jena and Spazz. Joe meets with them.
Tuesday, January 4, 2000.
Quit their jobs, file patents, set up meetings. Spazz and Tulip take off and spend the night together.
Wednesday, January 5, 2000.
Joe nearly kills Spazz in the morning, but Wackle talks him out of it. VC meetings all day, culminating in Clement Tingle at 5 PM with Momo.
Monday, February 28, 2000.
Rollout, big orders, Joe sleeps with Tulip.
Tuesday, February 29, 2000.
Wackle kills Momo, Joe gets saucer steals grolly. Deet shows up, berates him, spills the beans. Joe cuts off Mophones, runs to Jenna, saves her life, goes to Dronia.

Words and Phrases

"Gnar" short for "gnarly".
"Harsh toke" for "tough luck."

Names of the Extra Dimensions

Pickover uses "upsilon" and "delta" instead of Hinton's "ana" and "kata," arguing that these terms are easier to say and remember since they're a bit like "up" and "down." At first I resented his tinkering with the canon, but I do think he has a point. Upsilon is

particularly nice, but I think delta could be improved upon. But, not let's just make up entirely new names, I'd rather not have any whiff of Greek or of, especially, the D. U. fraternity. upsie and downsie. upsilon and downabel. upsilon and downdown. upsilon and kata. upper and downer. upup and downdown. superup and superdown. hyperup and hyperdown. klarg and flant. klurg and flont. klup and blowk. klurg and dront. klup and dron, these are easy and close to up and down.

I started out the book with klup and dron, but in Chapter Seven I changed my mind. It's misleading to think of the fourth dimension as being like "up". That was a conceptual error in Pickover's nomenclature that I feel for.

The appeal of the analogy is strong if you think of a 2D world as being like Abbott's Flatland, which has East/West North/South and for which up/down is the higher dimension.

The thing is, it's more useful to think of the 2D analogy world as being like Hinton's Astria than like Abbott's Flatland. More useful because then we can put the 2D people on a disk planet, and we are on a sphere planet, and the 4D beings are on a (very large) hypersphere planet. Astria has up/down and East/West, and our extra dimension is North/South.

Another point to think about is the difference between body directions and planetary directions. My body is up/down, left/right, front/back. A 2D person has up/down and left/right (if we suppose them to be bilaterally symmetric, otherwise they have front/back). A 4D person has an extra direction that I am currently calling vinn/vout.

Now the planetary or world directions are 2D: up/down East/West, 3D adds North/South, and 4D adds Kata/Ana.

It's slightly confusing because up/down is the same for all: it's determined by gravity. East/West is determined by the motion of the sun, while North/South is determined by climate (also by the sun).

Names for the Lands and Peoples of Higher Space

What should Momo call the land she comes from? And the two halves? Maybe Klupdom and Dronia, inhabited by Kluppers and Dronners. Or Dronians?

Spaceland splits Higher space in two regions, inhabited by the Kluppers and the Dronians. Or Dronners? I kind of like "uppers and downers" sound-alike.

I see the Kluppers as California yuppies, and the Dronians as Mexicans. Or maybe just rich people and poor people.

Is the word Dronner better? It makes the two more similar, Klupper/Dronner. And this would be good if there were all-but-identical tribes like Lilliputians and Blefescuans (sp?). But I have had so many names of the -XXer type,, e.g. bopper. (Maybe it's really a secret way of saying the N-word: my Kentucky heritage seeping through. I always did think of the boppers as black people.) So maybe since I want the Dronians to be rather different from the Kluppers its better to have a different sounding name for them. But still, writing it, I just like the sound of Dronner better. What can I say, I'm a pinhead. And Dronian sounds more like believers in a religion? People of the Dronian persuasion. I remember a black comedian talking about Mayor Dailey's phrase "people of the Negro persuasion." "Ain't nobody have to persuade me none. I look in the mirror, and I'm *persuaded* I'm black." Dronian sounds kind of sinister too. And

actually they're very good-hearted beings, the Dronners.

But the whole thing is what? Abbott called it Thought land. Allroom. Allinall. Overspace. Overworld. Fourspace. Space4. Hypercosmos. Quadriverse. Quadraverse. Quadverse. Quartuverse. Quartiverse. Quaverse. Fourverse. Hyperworld. Megaverse. Blixen. Blxt. Blicht. Lally. The Lally. The Lalla. Cosmos, Universe, World, All. The All.

"Your Spaceland divides the All into two halves which we call Klupdom and Dronia. I come from Klupdom; and my race is called the Kluppers. On the other side of Spaceland lie the Dronners of Dronia."

Characters

I would like to work in some identifying traits for my characters, at least seven each.. I will put asterisk* by those that I haven't worked in yet.

Momo

I need a 4D character to be a stand-in for A Sphere. What should he/she be called? Not A Hypersphere. I thought of using the "Om" name from Realware. But it's not the same kind of being. Sylvia suggested "Mo." Momo is good. Or Om4? I also want to give him/her a personality. And eventually I'll want more than one of them, a nice one and a mean one probably. The nice one can be like a woman, the mean one like her husband. Om is a nice female, her mean husband is called, say, Wackle.

Maybe one is an angel, the other a devil. I might use a reversal I seem to remember from some SF story or another: have the angel be red and leathery, and have the devil be glowing and with white wings. Humanity as gotten the appearance of these things backwards. The seemingly good Momo turns out to be the devil, while the seemingly evil Wackle turns out to be good, an angel.

Joe Cube

He's a guy like Steve Freedman, struggling a bit, a Gen-Xer who's trying to get rich without having any skills — a middle manager. Afraid to commit, selfish, has an Acura Integra, but wants an SUV. A complete patsy and sucker for every stupid fad to come along. Day trades a little, puts and sells. Was in marketing. Mediocre. Local Silicon Valley boy, wasn't a good surfer, but tried. Played volleyball. Comes from Campbell or Sunnyvale. Joe a total gull of the Y2K panic, staying home, a sucker, the pawn of every passing media frenzy. For similarity to A Square, the best name is Joe Cube.

He went to Colorado State University at Fort Collins. Majored in Business with a Computer Information Systems concentration. Worked for a couple of years running a software store in Boulder.

Got a Masters of Engineering Program degree in the Operations and Logistics track at U of Colorado in Boulder. Had a rough time with the math courses.

Low self-esteem. Ingratiating. Insensitive. Wants to wake up. Masochistic. Sexually repressed. Looks for a demanding bossy woman. But is scared of competent women, looks for a dumb bossy woman. Naturally attracted to Jena. Tulip represents a breakout to having a sane girlfriend who's not weak, a girlfriend who's smart.

Identifying Traits

1) Smokes*
2) Dresses yuppie*
3) Not tall

Jena Bonk

Joe's girlfriend. The kind off girl you turn your head to look at. Blonde, miniskirt, hair in an enticingly slovenly twist, high thick-soled boots. That's only her look. She's just a somewhat insecure not-too-bright girl. Worries a lot.

Maybe they're married. It's been less than a year. Make her a real bitch.

Was a Communications major at U of Colorado, Boulder.

Worked at Bucky's Casino, run by the Yavapi Indians, near Prescott, AZ. Worked as the Bingo caller.

Low self-esteem. Disorganized. Needs to enslave. Sadistic. Dominatrix, but can flip to sub. Sex has to be a game. Abused by step-father. Looks for conventional successful type. Naturally attracted to Joe. Spazz is a way to break out into being a sub. Also a way to validate her own chaos by being with someone chaotic.

Identifying Traits

1) Bites her nails.
2) Brown far-seeing eyes, hair dyed blonde.
3) Strong nose, high cheekbones, narrow eyes.
4) Pink skin.
5) Latches on to odd words and reuses them.
6) Pointed nose and sunken cheeks when worrying. Worries a lot.
7) Purses her lips when unsure.

Spazz Crotty

Go ahead and make him white, too, best-selling novels aren't racially diverse. Comes from a broken home in Idaho. Dad is a gun-nut, in fact have him be the Ruby Ridge Dad, and Spazz's Mom got shot by agents. He has artichoke bushes he's proud of. He's a punk. He and Ken go to concerts together.

Messy, disorganized, vain, egomaniac, unwilling to commit. A Don Juan. Not that attracted to Tulip, simply went for her as another conquest. Naturally attracted to Jena as he can dominate her.

Identifying Traits

1) Tattoos. Tribal on left arm, dice on the right.*

Tulip

Spazz's girlfriend, Hindu Indian family, born and raised in Mountain View.

Sunny, cheerful, self-confident Sane. But wants some chaos, disorder, creativity, bohemianism, filth. Naturally attracted to Spazz. Like Sylvia's attraction to me. Initially uninterested in Joe, flips to him only after she sees Joe and Wackle slaughtering Momo.

Identifying Traits

1) Smells like spices.
2) Smooth skin, chocolate lips, lively big eyes.
3) Triple-pierced ears.
4) Slightly pimply complexion.
5) Hanging hank of hair.
6) Seriousness around her mouth and darkness beneath her eyes.
7) Religious in the Catholic church.

Sante Machado

Identifying Traits

1) A handsome, muscular guy with a good tan.
2) A weary, pissed-off Dean Martin.
3) his eyebrows slanting down to the sides.
4) The kind of guy Joe was scared of.
5) Looking all mature and long-suffering.

Clement Treed

Identifying Traits

1) Tall, lanky.
2) Big mouth on a small head.
3) Monkish short hair.
4) Maximum L.L. Bean wear.

Drabk

Quotes from A. K. Dewdney, *The Planiverse*, (Poseidon Press, 1984).

You this one's name have called.

You have traveled far.

You came here with a purpose?

The knowledge beyond thought is beyond words as well. But knowledge of the beyond follows the knowledge beyond thought. And all by the permission of the Presence is.

The Presence is beside you. Closer than your body. Closer than your blood. I can point to all the dimensions, but not to the Presence.

A miracle proves nothing. It makes the imagination stronger but the understanding weaker.

You are appointed for knowledge and little time remains.

Repeat after me. "There is no presence by the Presence. There is no knowledge but the Knowledge."

...And the Presence your being pervades. When the Presence is made known to you, then in that radiance without thought, you will perhaps receive the first knowledge.

Flying is simple in principle. One merely leaves oneself behind. Flying is the first art — and the last refuge.

You have submitted to the knowledge. And this completes the first stage.

(Yendred: What could be beyond this? I've been to where fear and joy are one. All this is nothing.)

Then we shall travel to something. The knowledge beyond thought of the reality beyond reality. It has nothing to do with what you call philosophy or religion. If you follow only thought, you will never discover the surprise which lies beyond thought.

Ken Wong

Joe's boss, CEO of Kenco. (Do that bullshit about CFO, CEO, and I bet there's others.) Ken is a bland, flat-affect Taiwanese guy with a California accent. Give him some obsessions. Certainly he's into martial arts movies. Also has some odd vehicle, maybe something as banal as a Ferrari. A vast web porno collection? Video surveillance? Shiatsu dogs. All the banal ugly boring things that Chinese like. Gold and red and black. Big characters saying Luck and Happiness and Wealth. But he likes rap music too.

The Inhabitants of Higher Spaces

God and Jesus

God is not a 4D being. God is much more. The God who made the ants isn't an ant. The God who made 3D humanity isn't 3D. God is greater than us, greater than the 4D beings, infinitely great. The Kluppers aren't angels; we can keep the supernatural out of this. Humanity has indeed sometimes mistaken Kluppers and Dronners for angels and devils, but that's not at all what they are.

Jesus wasn't Jesus because of what Momo's ancestor Shalla did to him in the way of augmentation. He was Jesus anyway. But the Kluppers tried to use him. Shalla was the Tempter in the desert who lifted Him up to a high place. Here's the passage from the Gospels.

"And Jesus being full of the Holy Ghost returned from Jordan, and was led by the Spirit into the wilderness..."

"And the devil said unto him, If thou be the Son of God, command this stone that it be made bread. And Jesus answered him, saying, It is written, That man shall not live by bread alone, but by every word of God.

"And the devil, taking him up into an high mountain, shewed unto him all the kingdoms of the world in a moment of time. And the devil said unto him, All this power will I give thee, and the glory of them: for that is delivered unto me; and to whomsoever I will I give it. If thou therefore wilt worship me, all shall be thine. And Jesus answered and said unto him, Get thee behind me, Satan...

"And he brought him to Jerusalem, and set him on a pinnacle of the temple, and said unto him, If thou be the Son of God, cast thyself down from hence: for it is written, He shall give his angels charge over thee, to keep thee: And in their hands they shall bear thee up, lest at any time thou dash thy foot against a stone. And Jesus answering said unto him, It is said, Thou shalt not tempt the Lord thy God.

"And when the devil had ended all the temptation, he departed from him for a season." — Gospel According to St. Luke, Chapter 4, Verses 3-13.

That's great, the devil "departed from him for a season." So he came back? Like

in a Robert Johnson song. "Hello blues, give me your right hand." No, better, the devil came back a thousand years later! And got Grendel. And now came back for Joe.

Even though I don't see the Kluppers as the Devil in the theological sense of the term, I see them as devilish. They do want, after all, to destroy our world.

Kluppers and Dronners

The Kluppers want to get rid of Spaceland so they can rain destruction down upon the Dronners. They want to POP it somehow. They'd hoped Jesus could call for the end of the world, that's why they tried to get to him (Religion). Grendel was a magician, and almost could have done it (Magic). Now Joe has the opportunity thanks to the 3Set (Science).

Momo's deal to Joe isn't that Joe should "teach" about 4D. No, she wants him to start a company. Develop some 4D technology. She'll fill in the details later. She's like a VC. IPO. Joe needs Spazz as Chief Engineer, and Jena as CFO.

Now, the Dronners can pass through Spaceland at will. It's just the Kluppers who can only approach it every thousand years. And this really pisses them off. Spaceland is like a one-way osmotic membrane explicitly designed to exclude the Kluppers from fully half of the All. But although the Dronians can come over to Klupdom, they don't do it that much, as the Kluppers kill them on sight. They sneak over now and then to do things. Or maybe they come and sell stuff, there's a like market. And the Kluppers would like to go down and just seize everything and they can't.

I see the Kluppers as California yuppies, and the Dronians as Mexicans. Or maybe just rich people and poor people.

I currently have the Kluppers talk Victorian or Shakespearian style, like the characters in *Flatland*. But perhaps they should talk bureaucratic gobbledygook. Business-speak.

The Dronners should have a bohemian expressive way of talking. I don't think I can carry off homeboy patois. I'd like to do Ginsberg perhaps. Ginsberg, Jack K. and old Bull Lee. Poe is another possibility; I'm thinking of Emul and Berenice in *Freeware*.

The Economy of the All

Presumably there is some substance that the Kluppers and Dronians contest over. Something of value. What is it? Maybe spheres rotating around planes, a source of energy? Or something like ambergris.

Email

Walker

Email to Walker 1, September 8, 2000.

Well, I'm starting up a new SF novel again, so once again I come to seek your wisdom. And also a receptive ear for what screenwriters call (I'm told) spitballing. That is, spinning out some partially-baked ideas.

The book is called SPACELAND, it's a take-off on FLATLAND, set in Silicon Valley, opening on December 31, 1999. A higher-dimensional woman (at least she says she's a 4D woman, and has womanly-looking cross-sections) named Momo comes to visit

a product manager named Joe Cube. Her largest cross section appears to be human-sized. She refers to the higher directions as klup and dron. She carries Joe klup over his house wall, out to a field nearby and tells him she wants him to "preach the gospel of the Fourth Dimension." Joe of course knows jack-shit about the fourth dimension. Momo gives Joe "subtle vision" by stretching, or more correctly laminating, him to have some 4D thickness. He now has a klup/dron stack of 3D eyes, and if each them focuses down on our own space, the ball-like totality of the disk-like retinas acts as a 3D retina that forms a full image of things. Joe can see through walls. Momo's people have done this twice before, at the starts of earlier Millennia: to Grendel last time, and to Jesus the time before that. (**Q: Who would they do it to in 1000 BC? 2000BC?)**

Eventually I want Joe to fully pull free and go up on a romp in the 4D world.

I'm right now grappling with some interesting problems. I'd like Momo to be roughly the same size as a person (in terms of radius). I'd like for her to live in a city. I have the idea that our Spaceland (as Flatland in Abbott's book) is only accessible to the higher dimensional beings at the start of each Millennium.

For it only be intermittently accessible suggests that it is somehow locked up. Perhaps on display near her city in a cave.

How to fit our infinite Spaceland into a "normal sized" hypercave? Taking a page out of my nonfiction Fourth Dimension, it should be kind of like a Torah under a fisheye lens, like an Escher disk, better put, in which you can change the center. A hyperbolic plane. The whole thing fits inside a sphere of radius one meter, and Momo can somehow turn it and bring the area of interest into the center where its easy for her to see (using her 3D retina to form an eidetic copy of what's there.) And I was thinking of making this a lotech lobrow bestseller like the movie "Being John Malkovich"... Well, I don't have to harp on the Torah ball. Well, I could make it easier. Come to think of it, it would be Borges's Aleph!

An alternative might be that our Spaceland is a huge hyperplane splitting 4Dland in two, into a Heaven and a Hell, with angels and devils. This might be more fun. **But now, how do restrict the access to once every Millennium?** Maybe there's a repelling field around it that only lets up at these times. Or maybe they do pas through our space often (that would explain those darting things I see out of the corners of my eyes!), but only can slow down and talk to us once per Millennium? If half was Heaven and half was Hell, maybe they wouldn't move through very often anyway.

In either case it should be quite easy for Momo to move from one region to another of our Spaceland. E.g. when the characters fly to Los Vegas from San Jose, it should be easy for her to follow them. She shouldn't have to like take a plane. **How would a 4D creature fly? Would be about as easy, no, the same kind of r^n/r^(n+1) wing surface to mass ratio?**

The questions I'd like to input into your gigantic brain are what it might be like in 4D land. I'd like them to live on a planet, in other words, I'd like it to be pretty much like our own world, only with one dimension higher. **I know there are various things about physics that aren't supposed to work in 4D, but don't remember (or repressed) the details.** But I guess I might as well know them so I can, where needed, cobble together the necessary quarkonium-based femtotechnological blue-gluon workarounds.

If Spaceland is in a cave, that's pretty consistent with a planet. But if Spaceland is a hypersheet, then we could assume that it cuts in half the hypersphere of their planet.

North is heaven, South is hell. If it's an Aleph, then Momo moves relative to it by like turning it. If it's a sheet, then she has to fly.

If I make Spaceland an Aleph, then it doesn't seem to be useable as a divisor between Heaven and Hell. But wait. Remember the Einstein Rosen wormhole between two sheets of reality. A 1D circle around the throat separates two parallel Flatlands. A 3D sphere "around" the throat could separate two parallel 4D lands. So now there is an Aleph in a tunnel and this separates Heaven from Hell. It's not really a tunnel, it's a wormhole between two parallel 4D worlds. Gnarlier and gnarlier.

Let me think about the in between version. If I had two parallel 3D worlds connected by a wormhole, the wormhole would look like a mirrorball lawn ornament, except what I saw inside the mirror would be the other world. But now put Flatland onto the mirrorball. I can't see through the mirror ball anymore, even though the other world is on the other side of its surface.

This tack gives us a hyperspherical geometry for our own Spaceland. But that's dull. The happening guys are saying its hyperbolic geometry and probably finite. I just read a great old book by Jeffrey Weeks, THE SHAPE OF SPACE, about this topic. Turns out negatively curved doesn't have to mean infinite. You can have negatively curved and finite. To get a 3D manifold like this, sez Weeks, connect, e.g. opposite faces of a dodecahedron with a certain twist. So maybe that's what the Aleph is.

But in this process we've in any case made the Aleph symmetric, we've lost the Torah scroll.

What's wrong with that? Well, as I said before, I wanted Momo to be comparable to us in size. And on the other hand, I'd like to have her be able to hover Godlike klup above our space and dart in for intervention wherever she likes. A way out of this bind would be to suggest that maybe Momo really is very much larger than we are. And the thing she is sticking down into our space is a puppet. Or perhaps more like the dangly lure thing that certain deep sea fish have sprouting above their mouth. A nice image, but it breaks the possibility of having Joe walk around in a 4D city that's human scaled in size. Unless maybe there are two sizes of things in 4D land. The REAL humanoid things that are indeed our size. And the GIGANTIC things that only dangle humanoid sized lures like Momo. And maybe the REAL (and, paradoxically, good) humanoid things live in what they call Hell.

That's enough for today. Thanks for listening (even though I haven't sent it to you yet, you are in some odd fashion listening to it, i.e., I couldn't write this note without my mental image of you to address it to).

Walker's Answer 1

Candidates for earlier visitees (Western ethnocentric):
2000 BCE: Abraham (left Ur for Chaldea ~2100 BCE)
1000 BCE: David (~1000 BCE - ~972 BCE)

There aren't many natural phenomena which repeat with a regular periodicity on the order of 1000 years. One possibility is a long-period comet. Comets with such periods exist and one could imagine an "interloper" comet from another brane (see below) which opened the door as it passed through the inner solar system and shed interdimensional pixie dust. Such long period comets have orbits which are easily perturbed by the gas giant planets, which allows one to readily fudge precise chronology.

And comets have long been considered portents of great events and suggested as the origin of the Star of Bethlehem.

What you say about flying seems reasonable, without giving it a lot of thought. 2D wind tunnels working on sections of wing shapes give a pretty good approximation of local 3D behavior as long as you ignore vortices, etc. So 4D aerodynamics are probably like 3D as long as you stay away from extreme conditions (compressibility in the transonic regime might be a lot different since there's an additional direction for the air to escape into). But see discussion of multiply-connected space below.

The most commonly cited physical problem with four spatial dimensions is that forces such as electromagnetism and gravitation fall off more rapidly than in 3D and as a consequence there are no stable orbits. That puts a real crimp in imagining a universe even remotely comprehensible to 3D creatures like us. Further, though I don't recall the details very well and can't seem to lay my hands on a reference, quantum mechanics blows up in ugly ways if you have more than three extended spatial dimensions. The string guys explain this as due to the topology of strings constraining only three dimensions to expand to a large size. But then the universe *likes three*:

Three spatial dimensions
Quark charge: units of 1/3
Three quark colors
Three families of quarks/leptons
Three forces (electroweak, strong, gravity)

This segues into one of the hottest topics in gravitation and superstring (M-) theory. Since the 1980's the string gang has assumed there are six or more additional spatial dimensions but that these are "rolled up" or compactified so they aren't perceptible at the energy levels accessible with accelerators. The assumption was that these dimensions were of the Planck scale, 10^-33 cm.

A couple of years ago somebody realized that as long as the electroweak and strong interactions were confined to the three dimensional "brane" we inhabit, no experiment could rule out the possibility that one or more of the additional dimensions could be as large as the millimeter scale. If gravitation propagates isotropically in the additional dimensions, this would explain why gravity is so fantastically weak compared to the other forces which are confined to the 3+1D brane. Objects in other brane-universes would be detectable by their gravitational interaction, and this might explain the "missing mass" that so puzzles the cosmologists. For an overview of this idea, see:

http://gravity.phys.psu.edu/mog/mog15/node11.html

This is accessible to experiment. If the extra dimension is on the order of a millimeter, then tests of Newtonian gravity should show divergence from inverse-square behavior at distances less than this. Nobody's done this up to now because it is so Hellishly difficult to null out the non-gravitational forces with on the tiny test masses you're forced to use. Since finding a violation of the inverse square law would be a shoo-in for a Nobel prize, there is quite a bustling little industry cobbling together tests for gravitation at short range. A summary of experiments underway and planned is at:

http://gravity.phys.psu.edu/mog/mog15/node12.html

A scale-scale compactified dimension into which gravity propagates might also result in "missing energy" in particle physics experiments in the energy range accessible with the LHC or possible the Fermilab main injector upgrade soon to go into service.

People will be looking *very closely* for such effects.

According to the stringies, every point in our 3 spatial dimensions is a rolled-up six-dimensional Calabi-Yau space. But why assume these extra dimensions are simply connected? A 10- or 11-dimensional space admits kinds of connectivity far gnarlier than an Einstein-Rosen bridge. Suppose Momo exists in 4+1 dimensional space but has the ability to *choose* the four spatial dimensions in which she moves. (I don't consider multiple time dimensions, as that risks one's being accused of hanging with the saucer dudes.) With one orientation, she sees our 3+1 brane as one of an infinity of parallel universes foliating 11-space. Take a turn to the klup, and you can take a short-cut through a compactified dimension to a distant point in 3/4 space. Let's do the space warp again! Also, it's a great plot device, like the Star Trek transporter, which eliminates lots of boring "how did she get there" detail--she *rode her bicycle* to the Coma cluster!

Regarding our Spaceland possibly being a “membrane” between Heaven and Hell, maybe access through the wormhole is possible only when the flatlanders (actually us--spherelanders) open up a conduit. This is the only way the spacelanders in Heaven and Hell can contact one another. The reason they're always fiddling with our minds is to provoke us into making the machines which open the door.

That’s right about finite negatively curved manifolds. If you admit a cosmological constant, which is the consensus view, there is no connection whatsoever between curvature, expansion/recollapse, and finite/infinite. Krauss wrote a nice piece about this which I read on the LANL preprint server a few months ago, but I can't seem to locate the reference now. You can probably find it under the "gr-qc" category.

With regard to your concerns about how Momo can be the same size as us, yet be able to move around our world rapidly, one of the aspects of the dualities in M-theory is the kind of scale-independence you alluded to in "Spacetime Donuts". When one lobe of the theory departs into a non-perturbative regime, it can be shown to be dual to another which has a tractable coupling constant. Momo's apparent size may be due to a projective transform from one space into another. When her retina scans a compactified dimension, she is omniscient, but when she projects into 3D space, she chooses her scale by how deep she dips.

Email to Walker 2, September 18, 2000

This is really helpful John. I'll send a frag of the book when it settles down a bit.

Any non-Western candidates for 1000BC and 2000BC? Any EGYPTIANS? I guess they're more like 10K BC.

I think I don't want to, at least not at this stage, worry too much about what the string theorists say. Hard enough just to get across the idea of a fourth dimension.

I've decided to drop down to a fairly simple hypercosmos. Forget the wormholes. The new Encyclopedia of SF refers to my penchant for "mathematical spaces of crippling complexity," so maybe don't go STRAIGHT into that more than necessary. Our Spaceland is a hyperplane (or at least looks like one at the scales my characters operate on) that divides hyperspace in two. The two halves have two tribes that we might think of as the Lilliputians and Blefescuans. (I read Gulliver's Travels while in Ireland this summer). Not that they're small, I just want two names for the tribes, who hate each other. Maybe the Kluppers and the Dronners is better, indicating the side of Spaceland that they hail from. Momo is a Klupper.

Now people have sometimes confused Kluppers and Dronners for angels and devils, respectively. But this isn't what they are. God, being greater than that which can be conceived, is certainly not a mere 4D being. God made the ants and isn't an ant, God made us and isn't a person, God made the Kluppers and Dronners, and he ain't one of them either.

So, OK, Jesus was the son of God independently of any confab the Kluppers and Dronners had with him. In fact, that time when the Tempter in the desert took Jesus to a "high place" and showed him the world and said he could be King: that was a Klupper talking to him?

What did the Klupper want from Jesus (and Religion)? What did the Klupper want from Grendel (and old Druid Magic)? What does the Kluppers want from Joe (and Technology)?

They want to get rid of Spaceland so they can rain destruction down upon those pesky Dronners, who hide beneath Spaceland like snakes under rocks. Want Jesus to bring on the End Times. Want Grendel to release the Dragon. Want Joe to Pop Space. This suggested by a remark of yours:

>Maybe access through the wormhole is possible only when the
>flatlanders (actually us--spherelanders) open up a conduit.
>This is the only way the spacelanders in Heaven and Hell can
>contact one another. The reason they're always fiddling with
>our minds is to provoke us into making the machines which open
>the door.

But I'm thinking something a little more drastic. They are coming on like a VC getting Joe to incorporate and make a little tech company to produce a product that will POP Spaceland, so it shrivels away like a soap film. Any thoughts on how to POP space?

A different question. Joe will incorporate, he'll be the CEO, I guess. Spazz the hacker will be the ... Chief Engineer? Or is there a more pompous title. And what about a weighty title for Joe's ex-wife Jena who will be in charge of marketing and PR. Maybe she can be a CFO as well. I heard someone babbling about these different corporate titles the other day, I know you know them all, so lay out five or six of them for me, please.

Walker's Answer 2

>> Any non-Western candidates for 1000BC and 2000BC?
>> Any EGYPTIANS? I guess they're more like 10K BC.

I haven't found any obvious candidates. Egyptians come onto the scope around 3500 BC; there are earlier Egyptian remains but these "predynastic" artifacts are difficult to date absent C-14 remnants. The reference I have at hand ("The Timetables of History" by Bernard Grun) comes up blank for well-known and dated figures around these dates.

I asked Roxie about Egyptian candidates, and she said she'd look it up when she gets back from the conference she's attending in Italy. Egyptologists don't usually think of things in terms of B.C. dates, but rather date events by dynasties and kings as the Egyptians did. An accurate chronology exists, but most people in the field just look it up in a book when they need it rather than carrying it around in their head.

>> But I'm thinking something a little more drastic.
>> They are coming on like a VC getting Joe to incorporate and make
>> a little tech company to produce a product that will

>> POP Spaceland, so it shrivels away like a soap film.

>> Any thoughts on how to POP space?

Sure. The canonical way to *pop* spacetime, which is perfectly plausible physically, is to assume that the vacuum is not presently in its lowest-energy ground state. The consensus inflationary big bang theory invokes the decay of a "false vacuum" to solve the horizon and flatness problems as well as providing the source of the energy of the big bang itself. Well, if the vacuum could be stuck in a metastable state way back then, there's no reason not to assume it didn't decay all the way to the ground state in that transition but has remained in an excited state ever since. Decay of the existing vacuum to the ground (or lower energy excited state) was first explored in the paper:

Coleman, S. and F. De Luccia, "Gravitational
Effects on and of Vacuum Decay", Physical Review D,
21 (1980): 3305.

in which they deemed the consequences "disheartening": the nucleation of a bubble of true vacuum anywhere in the universe expands outward at the speed of light and causes everything it touches to instantaneously collapse into a singularity. "Disheartening". The wall of such a bubble could be crossing the orbit of Pluto at this moment, having destroyed the entire universe in that direction,

and we wouldn't know it was coming for five more hours.

In 1983, Piet Hut and Martin Rees:

Hut, P. and M. Rees, "How Stable Is Our Vacuum?",
Nature 302 (1983): 508.

explored the possibility that a particle physics experiment might momentarily create conditions which trigger vacuum decay and thereby inadvertently destroy the universe, which would be bad. They concluded that since cosmic ray energies were so much higher than those produced by particle accelerators, any process which could lead to vacuum decay in a physics experiment would have already occurred innumerable times since the big bang in natural processes.

Still, folks worry. Prior to the start-up of the Relativistic Heavy Ion Collider at Brookhaven, a study was commissioned:

http://www.bnl.gov/bnlweb/rhicreport.html

to explore whether that machine might destroy the Earth or the universe in this and other ways. They concluded it wouldn't, and so far it hasn't. Knock on biocomposite.

Well, with photon squeezing, nonlinear optical media "particle surfing" accelerators, Bose-Einstein condensates in which the speed of light is 17 km/sec, Penning traps with femtokelvin temperatures, and a host of other cool desktop-scale experiments, who's to say a VC-funded start-up a few blocks from Page Mill Road couldn't create the novel physical conditions which would trigger vacuum decay. Destroying the universe would reduce the potential cash-out in the IPO, but that wouldn't bother the Klupper VC who only wants to get our pesky spacetime out of the way.

>> Spazz the hacker will be the ... Chief

>> Engineer? Or is there a more pompous title.

"Chief Technology Officer" is the moniker of choice these days.

>> And what about a weighty title for Joe's

>> ex-wife Jena who will be in charge of marketing and PR.

"Director (or Vice President) of Corporate Communications"
Here's some titles I proposed for hackers back in 1986:

* * *

Programmer
Enhanced Programmer
Super Programmer
Ultra Programmer
Virtual Programmer
Senior Programmer
Elder Programmer
Doddering Programmer
Intergalactic Exalted Cosmic Hyper Programmer

* * *

The latter seems about right for the fellow who figures out how to pop spacetime.

Email to Walker 3, September 21, 2000

>Sure. The canonical way to *pop* spacetime, which is
>perfectly plausible physically, is to assume that the
>vacuum is not presently in its lowest-energy ground
>state.

Thanks, I looked up some of those papers yesterday, this is perfect. I particularly liked Hut and Rees's description of the transition, that "unfortunate event" which leaves behind it a true vacuum with "...a geometry close to anti-deSitter space" and "singularity free." Pulling out my trusty Hawking and Ellis LARGE SCALE STRUCTURE OF SPACE-TIME I see that anti-deSitter space is a Minkowski spacetime with constant curvature $R < 0$. I'll have to read about it a bit more.

Of course what I'd really like after the POP is NOTHING, but I can fudge that. Maybe empty anti-deSitter space is close enough to Nothing for Momo's purposes. Maybe it really IS Nothing? Maybe there's some way to break it even more. The metastable vacuum decay can be like stage one followed by the complete collapse of space and time.

Now I'm thinking about what Momo will do to bring this about. What technology will she get our boys to implement? Serendipity, this month's *Scientific American* features articles about wireless broadband for "3G" (third generation) wireless phones. A really nice way to do broadband would be to stick a transmitting whisker klup into 4D and have receiving whiskers up there as well. The whiskers will be a little like periscopes, they shift an incoming light signal klup a tad and send it on its way. We can safely assume that the light will propagate along a 3D hypersheet parallel to our space, not bumping into anything till it encounters a receiver whisker. Different whisker heights get you all new interference free transmission bands. Should the beams be directed? Some guys in San Jose are talking about just that for antennas, but it seems like a lot of work, though certainly more power efficient. But with no smog or even air in 4D, it should be OK to just beam the signals out more or less omnidirectionally.

What to use for the whisker? Well...I could use Joe Cube's actual whiskers since he's been augmented to be 4D. But that's a bit uncontrolled. Also the light sent into one

end of his hair in this space wouldn't have a reason to bounce up into the hyperspace part of the hair. Have to think about this one a bit. Momo might just dump a carton full of the whiskers (l**asing diodes, John?**) with suitable periscope mirrors in them.

Some of the mumbo you jumboed me sounds suggestive. **Nonlinear optical media**?

>photon squeezing, nonlinear optical media

>"particle surfing" accelerators, Bose-Einstein

>condensates in which the speed of light is 17 km/sec,

>Penning traps with femtokelvin temperatures...

I still have to make up a reason why using these things bring upon us the eschaton, i.e. the decay of the metastable vacuum? One thought is that it might upset the Law of Energy Conservation to have light leaking off into hyperspace. Obviously you'd pump out more light through the transmitter whiskers than you'd take in through the receivers. Maybe this would drain the vigor out of the vacuum, cooling it in a sense, till finally a chunk of space tears loose like a mildewed sail in a stiff breeze.

And why doesn't Momo just pop our space herself? Maybe she's chicken, doesn't want to get toasted by the "enormous energy release". Wants to like give us the matches and dynamite and blaster caps and fuses and retreat to a safe distance.

By the way, in recognition of your signal and yeoman advising services over the years, I plan to make you one of the dedicatees of *Spaceland*.

Best,

Rudy, C.B.S.O.

[Note: By this I meant Chief Bull-Shit Officer]

Walker's Answer 3

>> Of course what I'd really like after the POP is NOTHING,

My understanding from having looked at this a long time ago was that at least one possible outcome of vacuum decay was the collapse of the entire universe into a singularity. I'd have to go back and re-read these papers to understand what "singularity free" means in this context--maybe they're saying that all pre-existing singularities in spacetime get "swept into" the global singularity of the collapse. This is plausible--although the details of black hole coalescence are a Grand Challenge computing problem, there's little doubt it will occur even in systems as simple as binaries.

The consequences of having our spacetime collapse to a point would need to be explained in terms of how it opened access between the Klup and Dron worlds. But if you think of our spacetime as a barrier (brane-like domain wall) between the two hyperspaces, then collapsing it to a point would presumably do the trick since the torn hyperspace would re-connect around the collapse (the M-guys have actually worked on this--a popular treatment is in Greene's "The Elegant Universe"). Imagine an embedding in which two 3+1D spaces called Heaven and Hell are divided by a 2+1D plane called Flatland which prevents their interacting. So 3+1D angel Momo dips down and "enhances" A Square to induce him to pop the pesky plane. Then add a dimension.

>> Momo will stick a transmitting whisker klup into 4D and have receiving

>> whiskers up there as well. The whiskers will be a little like periscopes,

>> they shift an incoming light signal klup a tad and send it on its way

That's a *cool* idea! Maybe radio waves launched into klup-displaced space only

propagate in *two* dimensions, not three. Then you only get linear, not inverse square attenuation, which eliminates a large part of the need for directionality in the antennas.

>> What to use for the whisker? Well...I could use Joe Cube's actual whiskers

>> since he's been augmented to be 4D. But that's a bit uncontrolled.

You know, mammal hairs *are* light pipes. That's why cutting hair (or shaving) causes it to grow longer and more rapidly. This is why other primates, who don't go to barbers, don't grow hair as long as Cher. Laser hair removal counts on this. Suppose Joe simply gets tired of shaving and asks Momo to cause his whiskers to grow klup rather than normal to his chin....

>> Nonlinear optical media?

This, in my book, had been about the coolest topic in desktop physics for the last 15 years, and the hits just keep on coming. There are substances in which energy density causes the index of refraction to change. This doesn't sound all that exciting until you realize it allows you to create circumstances in which light pulses don't spread out but rather contract into an extremely high power pulse, which allows creation of instantaneous power pulses with desktop apparatus comparable to giant particle accelerators. This same nonlinearity is the key to optical computing, many approaches to quantum computation, and is the underlying technology for the recent claims of faster-than-light signal propagation (actually, the leading edge of the wave packet triggers a cascade in the nonlinear medium which causes a pulse to be emitted from it before the peak of the incoming bell curve arrives--how you interpret this depends on your world-view).

>> I still have to make up a reason why using these things bring

>> upon us the eschaton.

This is reminiscent of an Asimov novel I read twenty-plus years ago, "The Gods Themselves". As I recall, dimly, somebody discovers an infinite, clean energy source which, it turns out, is actually tapping energy from a parallel universe. Realizing that "anticipated by Asimov" is a Bad Thing in the SF world, suppose Momo's hyperspace contains 4D (which appear as 3+1D embedded in our brane) destructive singularities ("stingularities") which, if imported into our spacetime, trigger its collapse into a point. These stingularities float around in Momo's world, causing the folks there no more irritation than billions of neutrinos coursing through us. The probability of one crossing over into Joe's spacetime through a whisker is small, but if four billion DoCoMo [Rudy note: This is an actual Japanese 3G phone company name] chattering monkeys extend broadband whiskers klupward, it's just a matter of months. Hence the VC funding.

>> And why doesn't Momo just pop our space herself?

Per the last paragraph, perhaps she just can't without the aid of somebody on this side to extend the whisker. Pursuing this further takes us into the domain of the Theology department. If G*d is endowed with the Three Big O's, [Rudy note: omniscience, omnipotence, and omnividence?] then why should prayer by a bunch of monkeys make any difference? Perhaps because there are things the Y--- man [Rudy note: He means Yaweh] can't do without a go-ahead on this end. ...but this direction invites ones' book making the Index, which is bad for sales. I'd say (which is consistent with history), that the Kluppers influence on our spacetime is limited to inspiring nakes [Rudy note: ?] to action, but not to direct intervention.

Email to Walker 4, December 22, 2000

Joe Cube, Jena, Spazz and Tulip are about to make a presentation to some VC types, presenting the Mophone. I don't think they will have Momo in on it, I think that would scare people off. Could they patent the whisker crystal even though they can't describe how to manufacture one?

Can you feed me a few telling details about how the room might look, or how the VC people might appear or behave? Any random detail at all that I could magpie in for verisimilitude. Like what somebody's briefcase looked like. Or maybe they're in a restaurant?

Hope your having a fun vacation.

By the way, my regular editor at Avon has already rejected Spaceland as "too weird," for crying in the sink. Weird compared to Freeware? Just when I'm trying so hard to be normal and write about relationships. I'm counting on Tor to come through for me now, like they did with Saucer Wisdom.

Have a SPACEd 20001.

Walker's Answer 4

>> Joe Cube, Jena, Spazz and Tulip are about to make
>> a presentation to some VC types, presenting the
>> Mophone. I don't think they will have Momo in on
>> it, I think that would scare people off. Could
>> they patent the whisker crystal even though they
>> can't describe how to manufacture one?

Momo probably would be a tad intimidating to the typical VC, although her "internal organ grab" trick might come in handy when hammering out the final terms of the deal. A description of this process is in the chapter "The Deal on the Table" in The Autodesk File (linked to my home page). Without the benefit of Momo's intrusive persuasion, we ended up walking away from the deal. Thank goodness. Not inviting Momo to the pitch is kinda like giving John Draper the day off for the shareholders meeting.

The patent situation has been fluid over the years. In the years 1985-1995 you could patent just about anything if you were persistent, willing to narrow your claims (which are the key part of a patent--not the description of the invention or its embodiment), and pay enough (typically about US$5000) to a savvy specialist patent lawyer who knows the ropes. If you pay more for a superstar patent law firm, you can probably get a broader patent based on the same invention. This situation led, among other things, to the litany of absurd software patents for the "invention" of things (like the XOR cursor, for which Autodesk was fleeced US$25,000 in 1985) that were in common use throughout the industry for a decade or more before the patents were filed.

As a result, USPTO have attempted to tighten up and improve the quality of patent examination, but notwithstanding a historical outlying data point to the contrary, patent examiners are no Einsteins. Further, "novelty" and "absence of prior art" is usually defined in terms of pre-existing patents, not common practice and/or published descriptions of the technique for which no patent was applied for. The abusive software

patent wave was compounded by this because for decades you could not patent software, so the instant they started permitting it, slimeballs started patenting everything they could think of, confident it would slide through since no prior patents would be found.

The U.S. patent office does not require a working model of any device other than a perpetual motion machine (not that numerous purported perpetual motions haven't been patented over the years). An appropriately drafted patent for something for which no scientific evidence exists at all can make it past the gauntlet. A striking recent example is the Mindsong patent for what amounts to a telepathically controlled light switch (garage door opener, etc.). I don't have the patent number at hand on my on-the-road machine but you should be able to find it at:

http://www.mindsonginc.com/

Rolled up dimensions are sufficiently mainstream (if speculative) physics that a similarly worded patent (if the effect exists, then this invention will allow it to be used for the following purpose) might well issue today. Of course, in a patent you want to give as *few* details as possible and make as broad a set of claims as will survive the examination process, since the less specific the patent, the more ways it can be used to attack specific competitors later on.

>> Can you feed me a few telling details about how
>> the room might look, or how the VC people might
>> appear or behave? Any random detail at all that I
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>> somebody's briefcase looked like. Or maybe
>> they're in a restaurant?

Any observations based on my own experience regarding VC morphology and ethnology should be taken with an elephant size salt lick as regards their behavior in the wild in A.D. 2000. My experience with VCs was entirely confined to the 1983-84 period, and the whole VC world has gone through five or six boom/bust cycles and fads since with, many of which involved an almost complete change of cast and culture. Second, the Mophone pitch is seeking seed funding, while at the time Autodesk was looking for venture capital the product was already shipping and the company was making money, so we were seeking would be later called "second round" funding. They didn't call it that at the time since nobody was doing seed funding.

The VCs we met, and we met a lot of them, were all over the map in appearance, approach, and behavior. There were grey-haired grandfatherly blood-suckers, young brash semiconductor nouveau riche soul destroyers who fed on collapsing the self-confidence of anybody with the ambition of following in their footsteps, seen-it-all portfolio managers ready to rewrite your entire strategy 5 minutes after they met you (and based on the experience of other people who took money from them, every monthly board meeting thereafter, all the way from funding through bankruptcy).

As I recall, of the twenty or thirty meetings we had with prospective VCs, all but two were on our premises (and of the exceptions, one was in 2nd story Page Mill conference room with the investment committee of a VC fund, one of whom had already visited us, and the second was in the conference room of our San Francisco lawyer at the time, again with a VC who had previously seen a demo of the product in our office). For

an operating company, it's natural they want to see the product, meet the management team, ask questions of people as they tour the place, etc. Obviously in a seed money situation it's different; probably at the modest two-room office/lab suite rented by the founders.

Since Spaceland is a contemporary period piece tied to the end 1999/early 2000 moment in time, you might consider having the Mophone team present not, to one or more conventional VCs (who were still tripping over one another at the epoch to fund bubble headed dot coms only a few months before the bubble burst) but rather a renegade rich dude modeled on Paul Allen (whose Interval Research funded, among other things, Dean Radin's ESP research; Interval shut down eventually, but I believe it was still going at the start of 2000) or Joe Firmage, who is funding Jack Sarfatti, Bernie Haisch, and others to investigate crashed saucers, propellantless propulsion, zero-point vacuum energy, etc. I've not met Firmage, but I get the impression he'd be really impressed if Momo *did* show up for the presentation--one has the image of her popping out of the projected PowerPoint slide into the room with trilling 4D "Ta-Da". Jack Sarfatti (sarfatti@well.com) can probably provide you the background for a character based on Firmage, and Lee Felsenstein (I don't have his E-mail at hand, but you can probably find it in Asilomar and Hacker's attendee lists since he's a regular at both) worked for Interval for most of its history and can probably provide Paul Allen anecdotes if you'd like to do a Coolidge on him.

> >> By the way, my regular editor at Avon has already
> >> rejected Spaceland as "too weird," for crying in
> >> the sink. Weird compared to Freeware? Just when
> >> I'm trying so hard to be normal and write about
> >> relationships. I'm counting on Tor to come
> >> through for me now, like they did with Saucer
> >> Wisdom.

I hope it comes through; remember when "too weird" was a compliment? Reading through the chapters you sent me, my take was it was the least "weird" (in the sense of being focused on characters and relationships as opposed to Saucer Wisdom-style ideas). Publishers....

> >> Have a SPACEd 20001.

Best wishes to you and your family for a happy holiday season and the second consecutive new millennium in as many years!

One more thing which occurred to me in the middle of the night after sending the last message....

Regarding patenting the 4D whiskers, high temperature superconductivity provides a very similar "worked example". Discovered in 1985, nobody is really sure how it works even 15 years later (although it seems pretty clear it has a lot to do with current propagation being confined to 2D planes in the bulk material). But even in the days when nobody had the slightest clue how it could possibly work, bookshelves of patents were filed and granted for high Tc materials, manufacturing processes,

technological applications, etc. and the IBM Zurich guys got a Nobel prize without even advancing a theory for how it worked. In Japan, where the patent system is even screwier than in the U.S., thousands of patents were granted for things like "superconductive washing machine", "superconductive vacuum cleaner", and so on.

The whiskers are very much the same, and there would be strategic advantage to drafting the patent in terms of "Hey, we don't know how it works yet, but these suckers provide broadband comm with low power and no EM spectrum." It's a little different in that the applicants can't disclose the manufacturing process as was the case for the superconductors, but there's a long tradition in patents (particularly for chemical engineering processes and semiconductor fabrication) of arm-waving about details which are essential to make the process commercially viable. For example, (in the spirit of the season, not as a serious suggestion):

> "After the silicon nitride passivation stage and probing of the active site, we leave the wafer out on the porch overnight with a glass of milk and cookies. The next morning the milk and cookies are gone and the wafer is then tested for functional devices which are scored, diced, and packaged."

Hellerstein

Comments on 11/21/2000 after reading chaps 1-7

I read through the ms.; thanks much. Some comments:

Your central problem is that the book's about something that neither you nor your readers have experienced, and thus cannot visualize except by analogy. "Spaceland" thus works best when the narrator relates hyperspace to our space; as when, for instance, he gets flipped over. Joe Cube's trips to Hyperland therefore risk a MEGO effect. He himself would have trouble explaining his sights to us. If I were you, I would not be ashamed to have him beg off explaining some of the wilder sights with a "you can't understand". Just have him tell us *what* we can't understand.

You note that we Spacelanders are vulnerable to Hyperland attack; and indeed even being taken into hyperspace is fatal to us without special preparation. You fail to note that the Hyperlanders are equally vulnerable to us; for we are all, from their point of view, one molecule thick, and thus are all of us dangerously sharp. If a Hyperlander appears in front of you, and you slap it real hard with a flat plate (such as a garbage can lid, or a shield, or a pizza plate) then that Hyperlander will fall into two pieces! I mention this to address the interdimensional power imbalance.

You once mentioned that every SF trope has a metaphorical meaning. Thus time travel is memory, space flight is escape, etc. Well, I see the 4th dimension as meaning the 'spiritual' dimension; insight; higher states of being. Thus for "Spaceland" to become a major Rucker work, you need for Joe Cube to undergo some major spiritual growth. He needs to grow some muscle, skin, and eyes in a direction he couldn't see before. That's what he did physically, in the story; now he must do the same dramatically, for the

benefit of the reader.

For this reason I strongly advise against killing off the Jena character. She's his wife, his partner, his heart; an abused and unfaithful heart, to be sure, but his nonetheless. What better way for him to grow a mental dimension than by getting right with her? (One way or another.) But how could he do so if she dies? And no, finding her again as a 4D ghost doesn't make it.

There are other considerations. You're a popular writer; you know quite well that the first rule of SF heroism is that you have to save the girl as well as the Universe - preferably in the nick of time. I realize that one gets edginess points by violating this canon to some extent; and there are loopholes. Such as; the girl's evil, the guy's an antihero, she's the tragic victim of evil alien attack.

But I don't read Jena as bad enough to deserve death - especially one so gruesome as falling apart in hyperspace. (I visualized her individual body parts popping back into 3space; her bones, one by one; her shit, lymph and blood splashing around at random; her brain and spinal cord making a messy PLOP... Yuck!!!) You describe her as pretty; pretty girls don't die messy in popular fiction. (Tragically and glamorously, if at all!)

As for Joe Cube as anti-hero; that's a self-limiting role; no room for spiritual growth, and thus no room for what 4D met aphorizes. Also, it's ultimately a sales-killer. Why bother to sell to misogynist sociopaths? There aren't enough of them, and they're too damn poor and cheap to buy your books!

She dies as victim of evil aliens? Well, that might work... as a way of showing you mean business. But to make it work as literature you'd have to wring every ounce of pain out of Joe Cube. I visualize him grabbing onto the hole in space for dear life, and thus unable to do anything as his wife's bones, blood, and brains rain down around him... Aieee! Are you up to showing that much pain? Please note, Rudy; to depict such agony with conviction and authority, you would have to draw upon personal experience. If you've had such loss, then maybe you'd prefer to keep it to yourself; and if you have not, then you risk writing a 'flat' climax. Also, Rudy, it's tempting fate.

Here's the scene as I see it: Joe Cube rushes up to his ex's apartment; he sees her on the fatal phone, so he barges through the wall. She's either calling his voice-mail, asking to get together again, or she's calling the other man; I'm not sure which. Space is just about to pop, there's no time to explain, so he slams the phone out of her hand with a brutal blow (and remember, he's 3 times normal strength). While she screams with pain and outrage at him, (he's broken some of her bones) he grabs the phone and tries turning it off. Alas, a glitch; the damn electronics take a couple of seconds to shut down! (A common failing with high-tech, I've noticed; and you should foreshadow this with a prior mention.) The hole opens in his hand, he tries squeezing it shut, it oozes out of this clenched hand, he grabs at space with both hands, the hole expands to arms-length diameter, with him sucked inside, holding on for dear life. She runs off, panicked.

The twist; though he saves her and our Universe, she leaves him anyhow. She cites, in particular, the gullibility that led him to collaborate with evil aliens.

****

One way that 4D intersects spiritual status in your book is the Dronner/Klupper conflict. I see Joe Cube as taken in by the Kluppers' wealth, ignoring their moral depravity; whereas the Dronners would, by contrast, presumably be poor but honest. (They save our space, etc.) Would discovering this constitute growth for Joe Cube? What

'subtle insight' would he derive for this, other than the obvious? (Don't trust rich schemers? Money ain't everything?)

By the way, if the Kluppers are an Empire (complete with Empress) then shouldn't the Dronners be a Republic? Perhaps eventually there'll be alliance between the Dronners and the molecule-sharp Spacelanders. Don't tread on us, Kluppers!

****

Oh, by the way, did I mention that the 20th was my 43rd birthday? The 'Realware' copy thus counts as a birthday present; thank you, thank you! I didn't even ask or mention, you didn't know: a karmic present?! Gnarly!

My Answer

That's a good idea! I may well use this. I WOULD like to kill SOMEONE with the no-space ball, though. Spazz would be a natural candidate. Or, even better, that Dean Martin-esque gangster. Sante. I hadn't thought their innards would necessarily be raining down from everywhichway, I'd thought of them just disappearing along with the space, but having them rain down is a tasty idea.

Sante's liver plopping down in the middle of the floor. And then a dog runs off with it. Jeez, I better get a dog happening soon. Or maybe it lands on a Weber kettle grill out in the back yard. Sante can be running after Joe as he pushes Jena. I had a dog run off with a guy's tongue in Bruegel, so I guess it would be overkill to do it again.

And yes, he has to not end up with Jena in any case.

I love the totally annoying thing that the phone won't turn off right away. I get so sick of waiting for my computer to turn itself off and let me leave work at school.

Other

Email note to a fan about ER Bridge

>you got any idea of where to find an Einstein-Rosen bridge? please don't
>think I'm mad, I'm just hopeful
>valentina

Funny you should ask, I was just thinking about this question, for use in an SF novel I'm working on. Right now I'm leaning towards a drainage tunnel passing under Route 17 in Los Gatos. Part of the concrete was eaten away by a flood, making a kind of cave in the tunnel wall, and there's something bright in there, yes the Einstein-Rosen bridge glowing like a luminous lawn-mirror. But wait, what's that on the surface of the mirror? A spherical copy of Flatland! Curiouser and curiouser...

Tech

Possible Embeddings of Spaceland in Hyperspace

Heaven-Earth-Hell Model

The simplest is to have Spaceland a hypersheet between Klupdom and Dronia, just like Earth between Heaven and Hell. I'd like to have Klupdom be like a Bruegel picture. A landscape like Schlaraffenland, and they walk through it to a palace. My problem now: how to interface the hypersheet of Spaceland with the hypersphere of the Kluppers' planet? I could have the Kluppers floating in the sky, which means they have

wings, which I don't really like, as I don't want them to be all that much like angels, it seems kind of *Family Circus* to get too deeply into the Christian iconography. "Wook Biwwy, a *slobber* angel!"

A good thing here would be that the Kluppers could go to just about any part by flying. See the Scale notes below for how this might work.

A bad thing is that it's sort of hard to get to Spaceland, and you can't sneak there. Everyone can see all of it. So its hard for the Dronners to be skulking through to make trouble.

Some material along the Heaven-Earth-Hell lines is in the *Unused Material* section.

Cosmic Wall Sticking Out of a Hyperplanet

To get rid of having Momo fly like an angel, I could turn the Heaven-Earth-Hell model sideways and have a plain or surface of a hyperplanet which is broken by the endless hyperwall of Spaceland. It wouldn't seem quite right for it to touch the ground — if it were embedded in the dirt it seems the dirt would be sticking through Spaceland. So you'd have to have it in a ravine. A cliff such as one imagines at the edge of the Flat Earth, with Spaceland extending forever upward and forever downward into the abyss. Here we have a problem with why Earth in general and Los Perros in particular would happen to line up with the region next to where Momo walks to.

I think I'll go with a variant of this I call the Sandwich Model, as described below. But first some more exotic possibilities.

Double ER Bridge

If I wanted to avoid having Klupdom be a slab or giant planet of possibly infinite size, I could get still fit an infinite Spaceland into a Klupdom cave by using a triple hyperhypersheet thing. In this case Dronia would actually be a different 4D world parallel to Klupdom, rather than a different region of the same 4D world.

We could do it with two ER bridges. We use three hyperhypersheets of hyperspace. One is Klupdom, one is Dronia, and in between is an all-but-empty hyperhypersheet, accessible by hyper-Einstein-Rosen bridges from Klupdom and from Dronia. In between the mouths of the Dronia hypertunnel and the Klupdom hypertunnel is a 3D hypersheet separating them. This is Spaceland.

Torah View

If I don't like having Spaceland be infinite inside the cave, I could Escherize it into the inside of a sphere of negative curvature. The ball is in some fashion like a scroll; the focus of the ball's central viewpoint is something that changes with the wishes of the viewer.

The Torah view is perhaps another of my "mathematical spaces of crippling complexity," so I'm inclined not to use it. I put some unused Torah view excerpts down in the Unused section.

Pucker Scale

If I don't have Torah view, I have the issue of how Momo can (a) find Joe so easily and (b) travel rapidly from Vegas to Los Perros. Either flying or pulling herself along on the cave ceiling hand-holds.

We could suppose that hyperspace is vastly stretched near the Spaceland sheet. So if you go about a hundred feet away from it, then you are a thousand miles long. The effect is that you fly up a very small amount, and the world dwindles astonishingly much. And then you move a little with, in effect seven-league boots, and then when you fly down it gets bigger very fast.

The way it works is like this. Think of a Lineland that is fractally bumpy. It is glued onto a smooth latex sheet. The sheet puckers all around it. Like a scar that rises up and down in a smooth surface. As you get closer you get into canyons of extra space. You seem to get smaller. There is a lot more room near small things than we realize, the space near small things has high negative curvature.

This might help explain why things tend not to fall in onto us, as matter geodesics avoid negatively curved regions (looking for shortest path) so in effect there would be a repelling force coming off Spaceland.

We have the question of why it is so easy for Momo et al. to keep finding Earth. Perhaps its not all that easy. Perhaps Earth peregrinates and only occasionally, as in once every thousand years, happens to be conveniently close. Though the great year of the galaxy is much longer than a thousand years, so why would it come around so often? Well, perhaps there's a hookup between the motions of the All, of Klupdom and Dronia.

I decided not to have the distorted scale near Spaceland, and just to have it the same scale and to let Momo use a Wacko flying saucer to move from place to place. The Unused section at the end has some pucker scale things I took out.

Sandwich Model

I could do a Wall Between the Worlds, but simply have it be underground, with lots of tunnels leading down to it. I could put Spaceland down inside a cave in other words. The cave would probably be infinite, though maybe it's a large hypersphere (see below).

So we have a sandwich world, with Kluppers walking around on the top slice of the sandwich and Dronners walking around on the bottom (upside down relative to the Kluppers) and there are tunnels down through the bread of the sandwich and the filling is Spaceland which floats in a gravity-free zone (balanced like the center of the Hollow Earth). Near Spaceland, Kluppers and Dronners pull themselves along rapidly by using hand-hold like outcroppings on the rocks. Or they fly about with little saucers.

So there would be a tunnels that Momo goes through to get to Spaceland. And if she were to go through Spaceland there would be a space and then the underside of the slab of Dronia, with tunnels leading out to Dronia proper. A different part of the four dimensional world.

Note that here Klupdom and Dronia are disconnected from each other and may well have independent motions. They could, e.g. be rotating in opposite directions — shades of the planetary Wimshurst Machine at the center of the planet in my *Hollow Earth*.

Gravitational Attraction Towards a Hyperslab

If Klupdom were an very large hyperplane, possibly with some hyperthickness, would this be OK in terms of gravity? Over a period of several weeks, including some email with Beeson, I worked this out in a Mathematica notebook called Gravitating Slab.. Here's the summary.

Suppose we put a test particle P of unit mass on the surface of a 3D cylindrical slab of radius R with thickness T and density the same as Earth's. What is the downward force F(R,T) felt by P?

We show that for large R, the value gets asymptotically close to 2 Pi T.

This means that if we take R to be very large, then a slab with thickness of some 2500 miles will have a surface gravity comparable to Earth's.

Now suppose we go to 4D space and have a 4D hypercylindrical slab. Assume also the gravity falls off with the cube of the distance.

We show that for large R, the value of the "downward" gravitational force gets asymptotically close to a.

This means that a large hyperslab of thickness about 800 miles will have a gravity on the hyperslab's hypersurface comparable to Earth gravity.

I still didn't figure out if you feel a gravitational effect when you are inside a hollow 4D hypersphere shell, but I suppose you don't.

Hollow Hyperearth

If we go with the Sandwich model it seems natural to have Klupdom's shape be the cross product of Spaceland and an interval. We could suppose that Spaceland and Klupdom bend around into a vast hypersphere. In that case it might be that Dronia would be something other than a slab. It could be a void, or it could be full of floating junk. Or an enormous plant. If it were floating junk, the Kluppers might view it as a free-fire zone.

The virtue of the Sandwich model is that then the gravity of the two layers balances out at Spaceland, so the Kluppers and Dronners are weightless near it. It might be best to in fact have a repelling force emanate from Spaceland so junk isn't always falling into it. But if this force is at all powerful, then its hard for a Klupper to hold steady while reaching down to do stuff to us.

And as I said before, they walk on the 3D hypersurface just as we walk on the 2D surface of Earth. Interesting thought. And beneath their surface like a layer of permafrost is Spaceland. Or maybe it's more like an armature than a permafrost. And maybe inside it is emptiness. A Hollow Earth!

A Domain Wall

Or we could have Klupdom a hyperthick hypersheet of matter riding on the crest of a repulsive field from the hypersheet of Spaceland, which is a moving domain wall (they move at the speed of light) between regions of different kinds of physics. There'd be no sensation of motion — unless, of course, there were something you're moving towards. We might suppose though that Spaceland is accelerating so there is some gravity from it.

If this were the state of affairs, though, wouldn't it be folly to try and burst Spaceland?

Another problem here is that although its easy to see the front side of the domain wall sweeping up an accumulation of matter that is Klupdom, its hard to see why the back side would accumulate an equal mass.

The Expanding Universe

In the Sandwich or the Hollow Hyperearth models we have the issue of

Spaceland's expansion. In the Sandwich model its not an issue, as Spaceland can be sliding relative to Klupdom and Dronia. In the Hollow Hyperearth model, we would need for the solid crust of the Hyperearth to be expanding, and relatively rapidly, which would be kind of hard to do.

Use Saucers

Why not give the Kluppers little flying saucers that they use to move around to different locations of Spaceland — and to different locations of their own land as well.

I have this image of a little saucer like a salad bowl with the guy sticking up out of it. Like the old arcade videogame Wacko.

Maybe the saucers are organic like in my "Easy as Pie" story. Maybe they grow on the rocks near Spaceland, like barnacles and limpets and mussels grow near the ocean. And the Kluppers pry them off and use them. In that case they'd be, again, very stupid to want to destroy Spaceland, which is the prominent feature of the chamber where the saucers grow. And probably the groo grows down there too.

What They Want From Us

To Damage Spaceland?

Suppose that the Kluppers view Spaceland as something that the Dronners hide under. So they want to get rid of it. Wouldn't it be more rational though for them to worry that popping this skeleton of their planet might lead to some drastic collapse? Maybe it wasn't always there. It's like an enchantment that the Dronners spun into existence. And in fact the continued expansion of Spaceland is in fact annoying to the Kluppers. It in fact is impinging on their Hollow Hyperearth.

Or maybe they just want to make a hole in Spaceland, a like window so they can see through better, and they haven't thought through the fact that the hole is likely to tear the whole thing and expand and destroy Spaceland utterly. There could be a reversal, where Momo is working away for the hole, and then learns that it would actually destroy Spaceland and is trying to collect all the cell-phones she's unleashed. Like ONE MORE CELL-PHONE CALL is going to destroy the universe! I like that. Very topical.

But if they do want to destroy or damage Spaceland, why wouldn't they just do it themselves? Why not just blast it somehow? Why do they need us to help them? Why can't they just put the whiskers in all over the place instead of expecting us to do it for them?

Maybe, as Walker suggested, there is some ethical or Rules of Engagement thing where they aren't allowed to kill us. But they are allowed to trick us into doing it ourselves. Perhaps they are very ethical. So Momo even has to warn Joe about the danger, as she gives him all the whiskers. This then takes on this allegorical tone, about how crappy it is to be killing everything for high-tech.

But a real physical reason would be better. Maybe what weakens the fabric of space is that light leaks out. You don't get back every bit of it that you pump out. Now, steering light into one end of those angle-iron whiskers is a delicate proposition. Something only a "flat" person like us can do, too niggling for a Momo to manage it.

If you have in mind the mirror-arrangement I described, the hypersphere with a mirrored inner hypersphere, that would in fact be easy to put into our space.,

Cell phone Antennas

The September, 2000, *Scientific American* featured articles about wireless broadband for "3G" (third generation) wireless phones. A really nice way to do broadband would be to stick a transmitting whisker klup into 4D and have receiving whiskers up there as well. The whiskers will be a little like periscopes, they shift an incoming light signal klup a tad and send it on its way. We can safely assume that the light will propagate along a 3D hypersheet parallel to our space, not bumping into anything till it encounters a receiver whisker. Different whisker heights get you all new interference free transmission bands. Should the beams be directed? Some guys in San Jose are talking about just that for antennas, but it seems like a lot of work, though certainly more power efficient. But with no smog or even air in 4D, it should be OK to just beam the signals out more or less omnidirectionally.

What to use for the whisker? Well...I could use Joe Cube's actual whiskers since he's been augmented to be 4D. But that's a bit uncontrolled. Also the light sent into one end of his hair in this space wouldn't have a reason to bounce up into the hyperspace part of the hair. Have to think about this one a bit. Momo might provide a carton full of the whiskers.

What's needed is like a prism that takes EM in and shunts it over into hyperspace moving in the same 3D direction parallel. One Flatland analogy for this is a cylinder sitting partly intersecting Flatland with its axis vertical, the intersection is a circle. And there are polished reflector cone dents drilled into the top and the bottom circles of the cylinder. The 4D version might look to us like a sphere with a shiny middle internal sphere, and whenever EM radiation goes into it and hits the inner sphere it disappears, bounced klupward. The receiver looks the same, but EM comes out of it.

But a round shunter like this would be made of essentially 4D matter and might not interact properly with 3D light. Also, I'd rather not have a shunter that could be used by the Kluppers.

The whole purpose here is that the shunter will weaken Spaceland's spacetime fabric by draining off light and upsetting our conservations laws. The Kluppers want to weaken the fabric to tear a hole. But for the purposes of the book, the Klupper can't do this without OUR HELP. So we will insist that the shunter be really 3D. In which case Joe's whiskers look pretty good.

Do Joe's whiskers have the all-important mirrors built in? Well the sides of the hairs are mirrors. It's just a matter of bending them. Bend them into a sigmoid shape. And then light would go in one end and come out the other going parallel. Yes. We can have Voule responsible for doing this to a batch of the whiskers. But whiskers are so floppy it doesn't seem easy to have the fairly rigid tolerance you'd want to get all transmitters and receivers in the same hyperplane at the same distance klup from us? No problem, we'll have Voule embed them in some firm plastic.

I'm worried that antennas are usually more complicated than just a light-pipe? I have this cathode-anode kind of image of an antenna, the old dipole thing, but maybe that's just because radio waves have a macroscopic wavelength.

I talked to Mike Franck (the brother of Kitty Hawker), he's an engineer who GaAs chips for cell phones. He says a gigahertz antenna would be like three inches long unless you were using a medium with a high dielectric constant. He says if you used

water the antenna could be only a millimeter long. He says EM radiation travels perfectly well in water provided that the water is *totally* pure.

The Two-Dimensional Dream World

Flatland

Let's suppose that Flatland looks like Victorian England. And the two that Joe focuses on are Edwin and Mary, named after Edwin Abbot Abbott and his wife Mary Elizabeth Rangely.

Better idea. The Flatland Joe sees should be of Joe's childhood in a small town in Colorado, like St. Matthews. Call it Matthewsboro. His parents are called Edwin and Mary, just like Abbott and his wife.

I'm not sure where to put in a dream of Flatland at all, or if I even should. I felt compelled to (a) to match A Square's dream of *Lineland* in Flatland, (b) to help the reader understand the fourth dimension by improving his or her grasp of the 4:3::3:2 analogy. But (c) if I can make Flatland *stand* for something with emotional resonance it really helps. And now I'm thinking, yes, my memories of my childhood and my parents, it is kind of like thinking of Flatland. A so-much-simpler world.

Astria

It's interesting — and not widely understood — that there are in fact two different kinds of 2D worlds. I think I will use the Hinton-Dewdney style flat world, in which the missing dimension is North/South rather than the missing up/down of Flatland.

Hypervision and Higher Body

3D Retina

Regarding the hypervision. Joe gets a 3D retina. The retina actually contains a complete 3D scene. Looking at Flatland, I see all of everything, including the insides.

Looking at my 3D world, my retina holds 2D blobs that are "inside" each other (actually on top of each other). I turn my head, or move, and all the blobs change angles. I don't see innards anymore, everything is sealed off by a 2D surface.

Looking at the 4D world, Joe's retina holds 3D blobs that are "inside" each other (actually klup and dron from each other.) He doesn't see hyperinnards, everything is sealed off by a 3D hypersurface.

I can get a 4D eye with a 3D retina in two ways.

Either stack up 3D eyes in the 4th dimension and let the sum of the 2D retinas be the 3D retina.

In either case, we might separate off the normal view from the subtle view and have them be experienced separately.

The extra view could be called , Subtle Vision, Second Sight, Third Eye, or Sixth Sense.

The views are different, for think of A Square with a 3D eye. A Square with a 3D eye doesn't really see the "normal" Flatland view with, as Rudy put it to me, "my wife's line going off at a cute angle in the fog."

****

My third eye held a three-dimensional retina with an image of a whole sector of

four dimensional space. It's like the way you can set up a two-dimensional canvas and color in a point for every spot of the three-dimensional scene in front of you. My third eye's retina was a three-dimensional canvas with a colored dot for every spot in the four-dimensional world. One way to best way to describe my third-eye images felt more like places I could enter than like pictures to look at.

Stack of Eyes

Regarding the stack of eyes, I would presumably have a 3D eye in our space with the others stacked klup from there.

If I were an augmented A Square with my thick eye intersecting Flatland, then I could see the normal view, but then klup from that I'd see the innards — though only if the klupper eyes were tilted in just the proper dronward angles.

Looking at our world, Joe sees the normal view, but klup from that he sees the innards.

Actually the augmentation had better not be an exact stack. Because any dimension eye should have a basically pinhole aperture for imaging. But a stack of A Square eyes would have a slit aperture, not a disk, a stack of human eyes would have a cylinder aperture, not a sphere

Here's some "stack of eyes" stuff I took out.

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"For the square to see as you do, he would need to get augmented — to gain three-dimensional thickness. If a higher being should laminate together a series of copies of our square, he will gain an up/down stack of eyes. A three-dimensional eye. The stack of line-like retinas would comprise a disk-like retina. The square will be augmented. And now, in this manner, I will augment you. I'll stack up copies of you in the fourth dimension. You'll have a stack of klup/dron eyes, and the stack of disk-like retinas will make up a properly ball-like retina, which is the key component of a four-dimensional eye. In this fashion you'll gain subtle vision and see nearly so well as I!"

Third Eye

Maybe assume the higher body is different in kind, not just a stack of copies. This would also make it easier to see why it could move and bend in 4D.I think it will work better to have a third eye, a truly 4D eye that is at the end of a stalk that plugs into your pineal gland. And if it is on a stalk then you can really use it to see down onto our world. It can be grown by proper stimulation of the pineal gland. We are in fact larval forms of 4D beings.

The eye on a stalk looking down. Just one extra eye to begin with, a klupper eye. Third Eye.

A hundred pages into the book, I'm still wrestling with how the third eye works. Originally I had the notion that it shows a 3D image, fine, but how do you actually view this image? And, what's harder, how does it work when you're viewing hyperspace?

One model of what's going on is the Hypercube98 program I wrote with Farideh Dormishian. In there, a 4D object is perspective projected down to 3D space, and is then parallel or perspective projected to 2D space. Note that a cross-section view wouldn't see this, even though you are looking at a 2D pattern. A cross-section regular-eye view would take a 3D cross-section of the 4D object and project that to 2D.

Let's suppose that the eyestalk grows out of Joe's vout side, the side facing

Klupdom.

[Option A and Option B] Let's suppose that the eye is oriented so that it has the same left/right up/down vinn/vout as Joe. So the stalk goes vout and the hyperspherical eye is mounted on it with the vinnward side of the eye towards Joe. The retina at the back of the eye is a 3D object that uses the vinn/vout, left/right, and up/down axes, but which does not use the front/back axis.

[Option A] Let's try thinking of the image formation as a 4D to 3D projection. We take a 3D spherical retina R using the vinn/vout, left/right/, and up/down axes, take a lens point behind [or vinn from, see Option B below] the eye, and for each point Q that's in front of the point L we draw a line QL and extend it to strike R in a point Q*, which is the image point. (Normally the eye is set up so that L is in front of R, but for now I'd rather not worry about the reversals this produces, so I'm just going to pretend L is behind R.) The projection collapses the front/back axis, but preserves vinn/vout, left/right/, and up/down.

If we like, we can think of the 4D projection as made up of a sum of 3D projections. The eye looks out and sees a vinn/vout continuum of non-intersecting 3D spatial cross-sections (rather than being strictly parallel to each other, the different cross-sections are a fan of views, that is, the hyperplanes generated by the eye's up/down, left/right, and forward + delta*vinn for various delta ranging from -1 to 1). Each 3D space is mapped down to a 2D image by the projection, for each of them the front/back axis gets collapsed and the left/right and up/down are preserved. The 2D images are arranged along the vinn/vout axis inside the eye's retina.

So the two ways of thinking are equivalent, I guess.

The next issue is how does Joe process this information. I think the best would be that the Third Eye has built into it a Viewer Eye that can be moved to any location and pointed in any direction within the 3D retinal image. This is akin to the Mind's Eye that I can use to put anywhere inside my image of my house. The default position would be at the center, pointing vout, so as to collapse the vinn/vout and get a view with left/right and up/down preserved, (and with front/back already collapsed from the 4D to 3D projection). The nearer vout lies on top of the further vout. And within each of these views, the nearer front lies on top of the further front. We might even specify that the Mind's Eye can take any segment of the views and collapse them, in Computer Graphics terminology, he can set hither and yon values and clip to only get the ones inside them. In fact he can have hither equal to yon and simply get a single collapsed 3D view.

The Astrian analogy. Astria has left/right and up/down. The higher dimension is front back. The Astrian (named Edwin) has an eye that looks right. There is a 3D eye on a stalk pointing up and it is aligned to point right. The Eye collapses left/right to get a retina that has a front/back and up/down axis. Astrian Minds Eye is located at the center of the 3D eye. It points front, and collapses the front/back to have an up/down view.

The Third Eye Looks at 3D Space.

Suppose Joe were to rotate his third eye so that the eye's front becomes Joe's vinn direction. Then the eye sees a vinn/vout continuum of 3D spaces each of which intersects Joe's 3D space in a plane. These plane images project identically to 2D images, which are arranged along the eye's vinn-vout axis. Then the eye contains a 3D copy of Joe's world, except that Joe's back/front is rotated into the vinn/vout of the eye's retina. But that's not something Joe really notices.

Joe's default Mind's Eye view is aimed in the eye's vout with is his body's front.

In viewing the third eye copy of the world, Joe can put his viewpoint anywhere he likes. So he can move forward and see the insides of things.

The Third Eye in 4D Space.

In 4D space, the default view will show the immediate 3D world, with the next one further vout behind it, and so on.

[Option B]

What I'm describing maps (x,y,z,w) to (x,y,0,w). And then the third eye user has the option to collapse this with map (x,y,0,w) (x,y,0,0). Why am I making (x,y,z,w) to (x,y,0,w) primary instead of a map from (x,y,z,w) to (x,y,z,0)? Because, again, I want the process to be similar to normal sight which collapses the front/back first. The latter map is what I'm used to doing first in my Hypercube98 program. Probably the order of the maps commutes, so it doesn't really matter. But, no the order does matter as which map we do first determines the structure of the third eye's 3D data set. I'm having trouble visualizing things in the space of vinn/vout, left/right/, and up/down, and I need to visualize them so I can describe them.

I could get back to the usual projection if I only picked my lens point to be *vinn* from the eye instead of *behind* the eye. So let's do that. .) The projection collapses the vinn/vout axis, but preserves front/back, left/right/, and up/down.

If we like, we can think of the projection as simply collapsing the vinn/vout axis by stacking the various 3D worlds on top of each other, with the closest world drawn last.

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Higher Body

Joe Cube needs to get a cover-up on his exposed 4D sides. Would be well to have some muscles there too so that he can differentially contract them and bend himself klup and dron. Let's suppose that he grows a sheet of muscle and skin in the 4D over his open sides klup and dron. To make him grow, Momo pisses on him — or, naw, pours water on him — and sends electricity into him. He itches, tingles, grows that new muscle and skin.

Let's say it adds a certain amount to his body mass and weight, even though its in the 4th D. It's a pretty thin layer on the one hand, but on the other hand it covers much more "area", i.e. all of him. Compare a skin rind around A Square to a skin over his whole inside. The NuSkin will in fact have a volume equal to the old body, assuming that it's the same thickness as before, and in fact we'd like it to be a little thicker. And you've got two of them, one above and one below. So Joe now weighs 450 pounds? Well, maybe. But that's to much.

I wonder if I could have his additional weight be less than that. We might suppose that Spaceland is 2 mm hyperthick, but the new skins are like only 0.2 mm thick each, so then he only gains like 20% of his mass, say, pounds, which isn't so bad. He could go from 170 lb to 204 lb, for instance.

The new muscle fiber is stronger even though its less hyperthick. It's structured in a special 4D way. Woven cables, not just strips.

You have to worry about the weight of the eye too. It could only be a few mm across, though. A mini-eye. A bug eye. A lobster eye on a long stalk. Don't want it heavy or it'll throw you off balance. Say 205 lbs is his new inertial mass.

Augmented Joe's Gravity and Inertia

I'd expect the gravity of Earth not to affect Joe's higher-D body. If gravity went off into the 4th D, then we wouldn't have the inverse SQUARE law. So gravity doesn't pull on his extra new flesh, which is about 0.2 of his old flesh.

I *would* expect the extra mass to have inertial effects. So now Joe's inertial mass Im no longer matches his gravitating mass Gm, it's a bit bigger. Everyone else feels a gravitational acceleration = Grav * Gm/Im, with Grav taking the G force and Earth mass into account, so for every normal object, gravitational acceleration is Grav. But now, for Joe, it's going to be like 0.8 Grav. He'll fall slower than other people.

Actually, we could use Mach's Principle and suppose that his inertia in Spaceland remains the same. Otherwise his inertia would be practically infinite as he bulks up. Of course that could be interesting, but then we really are looking at him becoming Superman. If he touches a table his finger goes right through the table. Ditto for people, which puts a real damper on love-making. Go to kiss a woman and you shatter her head. Well, if you damped your motion it wouldn't have to happen. "Joe, you don't know your own strength."

Thin Higher Body?

As discussed in Microphysics below, it's probably not a good idea to suppose that we are so thick as I was just supposing. In this case the higher muscle and higher skin is really quite a substantial addition of matter. So here we might have to say that neither gravity nor inertia carries down into 3D? Or we could keep the enhanced strength and inertia and have Joe be like Superman. But I'd rather not get into having a Superman right away. Maybe he isn't one at first, but then he bulks up! Thanks to all that groo he's eating. The initial higher skin could just be one or two atoms thick.

Microphysics

Molecules

If space has some non-zero hyperthickness T, we have various possibilities.

(a) T is perhaps substantial, like a mm, but our particles are all of the same hyperthickness T so we haven't noticed the hyperthick quality to our space. Thus a particle is like a hypercylinder.

(b) T is substantial and particles are small. At first this seems impossible as we would notice particles moving "through" each other all the time, much more commonly than the occasional quantum tunneling. Of course one might say the particles roll around on the "bottom" of our hyperthick space hypersheet. But then, what does it mean to say there is that extra thickness if it isn't used by our matter.

(c) The hyperthickness T is of the order of femtometers, so the particles just precisely fit. Here there's the problem that all particles aren't of the same thickness, so we'd think there'd be some slop. In this case the larger ones could be spheres but the larger ones would be in fact hypercylinders.

(d) Our particles are in fact hyperspheres but they are constrained to move in only one 2D plane. This is a bit like the rolling-on-the-bottom notion of (b), though here everyone meets equator to equator which is good. The problem as in (b) is what then it might mean to say that we have a thickness any greater than the thickness of a particle.

The Higher Skin is how thick?

3D TV

Imagine a TV that is a holographic tank showing images, and the images are pieced together by using differences between successive TV frames. It reconstitutes a 3D image out of the successive 2D images, even looking at different channels if possible. You see the things in a tank. Maybe the tank is vacuum-filled with a little haze to catch the light and lasers are painting it. Or maybe you're using a virtual image with a concave mirror putting it up there.

When Momo appears, Joe first sees pieces of her in the tank but then, weird!, the pieces move out of the tank.

Instead of a screen it has a kind of fish tank with no air in it, three-dimensional display that's thrown up there by a bunch of tiny mirrors on chips at the bottom. Killer tech, very hush-hush, and years away from commercial development. It doesn't actually work most of the time, and there's something about the tank that makes it dangerous. But I was friends with one of the lab guys.

Society

Materialism

Issue: Materialism is killing things. Where's the old hacker spirit? Computer isn't focused enough on itself anymore. What is my dream? Why do I want hyperspace.

Reality TV

Joe expects to become a preacher, but ends up as star of a reality TV show.

COMDEX

COMDEX/Fall '99, Las Vegas, Nov 15-19. 20th anniversary. 200,000 technology buyers. McNealy's speech, "Y2K isn't the problem. It's W2K and O2K." (Meaning Windows 2000 and Office 2000). Meeting at Las Vegas Convention Center. Could have stayed at the Las Vegas Hilton, right next door. Has 3,000 rooms.

References

Pickover [99]

Clifford Pickover, *Surfing Through Hyperspace*, Oxford U. Press, 1999.

This is very much based on my *Fourth Dimension*, as he freely admits in the book. But he has some useful other things in there. He tries very hard to visualize 4D beings.

He claims John W. Campbell coined the word "hyperspace" in "The Mightiest Machine" (1934).

A 4D being could invisibly impregnate a woman. Or vampirize someone.

p. 50. There might be spots where the 4D creatures can't reach our world. Perhaps there are hyperholes in the 4D world that wall things off from the 4D creatures. Like if they were cheese worms, and the holes were like holes in a Swiss cheese.

p. 123. Henry More: A dead person loses their hyperthickness, which is the soul.

He copies lots of Ernst Haeckel's drawings.

p. 56. "Incomprehensible flesh blobs suddenly materializing, changing in size and finally disappearing." "Pulsating bags of skin." Pictures p. 70: Giant noses and ears. p. 96: Sees "birds" that are gossamer wings on bodies resembling balls of twine. Glowing speckles on their skin. p. 141: "Blob shrinks to the size of a cantaloupe, yet retains its skin-like texture. Warm and soft like human flesh. Grows to the size of a large turkey, mostly flesh, along one side a ridge-like structure and a strip of black, velvety material (Perhaps inside of a nose.) Bounces on the floor, making loud slapping sounds. Like a biological oddity in a museum of pathology. p. 144: several floating testicles. They encircle the girl and close in on her, then she disappears with a pop. p. 146: put a blob in a bag and tighten the bag to trap the thing.

p. 146: Jump into hyperspace with a chain attached to you so your friend can pull you back.

p. 150. Attract attention by waving a flare in hyperspace. More balls come near you. some coated with enamel, teeth. A white ball: an eye. Then something that is the

eye's iris or pupils. Hyperpupil is a sphere on a hyperspherical eye akin to a disk on a spherical eye. To see A Square I'd put my eye into space and he'd see a 1D circle X-section of my pupil. When Momo looks at me, I'd see a disk cross-section of her spherical pupil in my space. This disk would be mimicking a retina seeing me. Just as the line of my retina would mimic a Flatlander's eye.

p. 152: "They gave me specifcations for building a 3D retinal that we can plug ourselves into."

p. 167: Quote from Edwin Abbott. Math won't really take you to God.

p. 211. higher D creators would have new senses. like what?

Sci Am [2000]

Nima Arkani-Hamed, Savas Dimopoulos and George Dvali, "The Universe's Unseen Dimensions," *Scientific American*, August 2000.

They suggest that the cosmos has a substantial hyperthickness of a few millimeters, compactified into a circle. Unlike all other forces, gravity is a 4D force. Gravity is actually a much stronger force than we realize. At small scales gravity drops off very rapidly, via an inverse cube law (in 4D) and at larger scales it drops off at the familiar inverse square law.

Flatland [1888]

At first I had this idea of finding a quote for each and every chapter. Listed below are some that I liked.

But then I decided that it would hamper the book to keep having those quotes. They would hobble the flow, insinuate that I couldn't explain things on my own, and set me up for invidious comparisons. So I'm only going to use the first quote; that one is kind of indispensable, as it's what set Spaceland off in the first place. And it's good to have *one* Flatland quote just to clearly anchor me to the precedent. But once the anchor's set, don't keep climbing down to look at it.

1. Last day of 1999.

It was the last day of the 1999th year of our era. The pattering of the rain had long ago announced nightfall; and I was sitting in the company of my wife, musing on the events of the past and the prospects of the coming year, the coming century, the coming Millennium.

— p. 64

2. A Stranger from the Land of Three Dimensions.

Stranger: "I am in no jesting humour. I tell you that I come from Space, or, since you will not understand what Space means, from the Land of Three Dimensions whence I but lately looked down upon your Plane which call Space forsooth. From that position of advantage I discerned all that you speak of as *solid* (by which you mean 'enclosed on four sides'), your houses, your churches, your very chests and safes, yes even your insides and stomachs, all lying open and exposed to my view."

I: "Such assertions are easily made, my Lord."

— p. 69

3. The Sphere shows his cross-sections.

Stranger: "Your country of Two Dimensions is not spacious enough to represent me, a being of Three, but can only exhibit a slice or section of me, which is what you call a Circle. The diminished brightness of your eye indicates incredulity. But now prepare to receive proof positive of the truth of my assertions. You cannot indeed see more than one of my sections, or Circles, at a time; but you can at least see that, as I rise in Space, so my section becomes smaller. See now, I will rise; and the effect upon your eye will be that my Circle will become smaller and smaller till it dwindles to a point and finally vanishes."

There was no "rising" that I could see; but he diminished and finally vanished.

— p. 72

4. A Square dreams of Lineland.

Having amused myself till a late hour with my favourite recreation of Geometry, I had retired to rest with an unsolved problem in my mind. In the night I had a dream.

I saw before me a vast multitude of small Straight Lines (which I naturally assumed to be Women) interspersed with other Beings still smaller and of the nature of lustrous points — all moving to and fro in one and the same Straight Line, and, as nearly as I could judge, with the same velocity.

Approaching one of the largest of what I thought to be Women ... I brought my mouth into a position full in front of her mouth so as to intercept her motion, and loudly repeated my question, "Woman, what signifies this concourse, and this strange and confused chirping, and this monotonous motion to and fro in one and the same Straight Line?"

"I am no Woman," replied the small Line: "I am the Monarch of the world. But thou, whence intrudest thou into my realm of Lineland?"

— p. 53

" Suffice it that I am the completion of your incomplete self. You are a Line, but I am a Line of Lines, called in my country a Square ... of Flatland, whence I have come to visit you, in the hope of enlightening your ignorance."

Hearing these words the King advanced towards me with a menacing cry as if to pierce me through the diagonal; and in the sat same moment their arose from myriads of his subjects a multitudinous war-cry, increasing in vehemence till at last methought it rivaled the roar of an army of a hundred thousand Isosceles ... and still the noise grew louder, and the King came closer, when I awoke to find the breakfast-bell recalling me to the realities of Flatland."

— p. 63

5. The fury of the Thinner Sex.

But unfortunately the passion of the moment predominates, in the Frail Sex, over every other consideration. ... In their fits of fury, they remember no claims and recognize no distinctions. I have actually known a case where a Woman has exterminated her whole household, and half an hour afterwards, when her rage was over and the fragments swept away, has asked what has become of her husband and her children! — p. 14

6. Touching someone inside.

"What do you say to my giving you a touch, just the least touch, in your stomach?

It will not seriously injure you, and the slight pain you may suffer cannot be compared with the mental benefit you will receive."

Before I could utter a word of remonstrance, I felt a shooting pain in my inside, and a demoniacal laugh seemed to issue from inside me. A moment afterwards the sharp agony had ceased, leaving nothing but a dull ache behind ... It seemed intolerable that I should endure existence subject to the arbitrary visitations of a Magician who could thus play tricks with one's very stomach. — p. 77.

7. A Square's speech at the Local Speculative Society.

I so far forgot myself as to give an exact account of the whole of my voyage wit the Sphere into Space, and to the Assembly Hall in our Metropolis, and then to Space again, and of my return home, and of everything that I had seen and heard in fact or vision. At first, indeed, I pretended that I was describing the imaginary experiences of a fictitious person; but my enthusiasm soon forced me to throw off all disguise, and finally, in a fervent peroration, I exhorted all my hearers to divest themselves of prejudice and to become believers in the Third Dimension.

Need I say that I was at once arrested and taken before the Council? — p. 99.

8. First trip to Spaceland.

An unspeakable horror seized me. There was a darkness; then a dizzy, sickening sensation of sight that was not like seeing; I saw a Line that was no Line; Space that was not Space: I was myself, and not myself. When I could find voice, I shrieked aloud in agony, "Either this is madness or it is Hell." "It is neither," calmly replied the voice of the Sphere, "it is Knowledge: it is Three Dimensions: open your eye once again an try to look steadily."

I looked, and behold, a new world! — p. 79

9. Omnividence.

Once more I felt myself rising through space. It was even as the Sphere had said. The further we receded from the object we beheld, the large became the field of vision. My native city, with the interior of every house and every creature therein, lay open to my view in miniature. We mounted higher, and lo, the secrets of eh earth, the depths of the mines and inmost caverns of the hills, were bared before me. — p. 81

10. Second trip: Sphere teaches Square of Solids.

Once more we ascended into space. "Hitherto," said the Sphere, "I have shewn you naught save Plane Figures and their interiors. now I must introduce you to Solids, and reveal to you the plan upon which they are constructed. Behold this multitude of moveable square cards. See, I put one on another, not as you supposed, Northward of the other, but on the other. Now a second, now a third. See, I am building up a Solid by a multitude of Squares parallel to one another. Now the Solid is complete, being as high as it is long and broad, and we call it a Cube."

"Pardon me, my Lord," replied I; "but to my eye the appearance is as of an Irregular Figure whose inside is laid open to the view...so that the very sight of it is painful to my eyes."

"True," said the Sphere; "it appears to you a Plane, because you are not accustomed to light and shade and perspective; just as in Flatland a Hexagon would

appear a Straight Line to one who has not the Art of Sight Recognition. But in reality it is a Solid, as you shall learn by the sense of Feeling." — p. 84

11. Overambitious wish to see higher dimensions.

Take me to that blessed Region where I in Thought shall see the insides of all solid things... and once there, shall we stay our upward course? In that blessed region of Four dimensions, shall we linger on the threshold of the Fifth, and not enter therein? Ah, no! Let us rather resolve that our ambition shall soar with our corporal ascent. Then, yielding to our intellectual onset, the gates of the Sixth Dimension shall fly open; after that a Seventh, then an Eighth — — p. 90

12. Final return to dull level Flatland.

My words were cut short by a crash outside and a simultaneous crash inside me, which impelled me through space with a velocity that precluded speech. Down! down! down! I was rapidly descending; and I knew that return to Flatland was my doom. One glimpse, one last and never-to-be-forgotten glimpse I had of that dull level wilderness — which was now to become my Universe again — spread out before my eye. Then a darkness. Then a final, all-consummating thunder-peal; and when I came to myself, I was once more a common creeping Square in my Study at home, listening to the Peace-Cry of my approaching Wife. — p. 91

13. In prison with no converts.

Hence I am absolutely destitute of converts, and, for aught that I can see, the millennial Revelation has been made to me for nothing. Prometheus up in Spaceland was bound for bringing down fire for mortals, but I — poor Flatland Prometheus — lie here in prison for bringing down nothing to my countrymen. Yet I exist in the hope that these memoirs, in some manner, I know not how, may find their way to the minds of humanity in Some dimension, and may stir up a race of rebels who shall refuse to be confined to limited Dimensionality. — p. 101

Books to Look For

Frederick Lenz, *Snowboarding to Nirvana* (St. Martin's 1997). Sky boarding in higher D.

4D Mazes at www.cs.columbia.edu/~cdo/maze/maze.html

Mirror for simulating 4D sight at www.eskimo.com/~billb/amateur/dscope.html

Unused Material

Jesus and Grendel

"I heard the Millennium doesn't really start till next year," I said uneasily. "You're too early."

"One of my ancestors was here for Year Zero, another was here for Year One Thousand, and now I have come for the Year Two Thousand," said Momo. "I've waited my whole life for this. I have only a short span of days in which to act. We have no time to lose."

"There wasn't a Year Zero," I persisted. "I saw a segment about it on the news."

"I mean the year before your Year One," said Momo. "My forebear was there. A four-dimensional woman as am I. Her name was Shalla."

"What did Shalla do?"

"She spoke to your Jesus the Christ as he was fasting in the wilderness, a youth near twenty. He was in fact born around 20 BC, you understand; he was indeed the Son of God. Shalla augmented Jesus; she laminated him klup and dron to make Him thicker than other men — thicker in the fourth dimension. And in this wise Shalla gave Him subtle vision — though this gift was in fact of little interest to Him. But for you, an ordinary man, augmentation will be a vast improvement. Are you prepared?"

"You want to make me like Jesus? I don't even go to church. I'm not some big ethical teacher. That's not me at all, Momo. You've totally got the wrong guy."

"The man we augmented in the Year One Thousand was quite unlike Jesus," said Momo in her low, well-modulated tones. "He was a solitary Viking magician named Grendel. He became so powerful a berserker that his enemies deemed him a monster. His legend lives in a book you may have read. *Beowulf*."

I had a vague memory of being assigned to read *Beowulf* in college. Back at Colorado State in Fort Collins. Bonehead English. I'd copied a girl's answers on the quiz. Betty something. Bright, cheerful face. Where was she now? I think maybe we'd had sex once, Betty and I, but it had been at one of those drink-till-ya-puke Freshman mixers when in the morning nobody knew what happened. And then I'd never taken her out again. Ah, the opportunities I'd let slip through my fingers. As for *Beowulf*? I had nothing to say about *Beowulf*.

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"Jesus and Grendel," I said slowly. "Both of them got murdered."

"Your fellows are savage, fearful brutes," said Momo. "Implacably against the new. This time will be different. You and I will succeed, Joe Cube. We'll use neither religion nor magic. Business and technology will be our path. You will spread the word of the fourth dimension, gather a coterie of followers, and build a wondrous device to forever still the pains of Spaceland. I have every confidence that you are the one. That clever machine of yours; it's what attracted me."

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"I think Jesus was already pretty on top of things before Shalla talked to him, though. In any case, they only get a shot at us once every thousand years."

"Grendel was the other one she mentioned?" said Jena. "The magic monster-man from *Beowulf*?"

"Third time's a charm," I said. "We hope."

Torah View

Spaceland floats inside a kind of cave near my home city. It appears to us as something like a crystal ball the size of one of your houses, wondrously filled with motion and life. One of the Great Mothers put Spaceland there — or discovered it.

***

We were in something like a huge stone cave. I could tell the stone walls were four-dimensional, because my subtle vision couldn't see through them. Floating in front of us was a crystal ball, maybe fifty feet across. The size of a small house. The ball and its contents were three-dimensional; I could see inside of every bit of it, just like I'd seen

into all of our townhouse back home.

"Behold your Spaceland," said Momo, her voice boomingly loud in the four-dimensional cave.

Seen from klup here, Spaceland was patterned in a really strange way. The middle of it was normal-looking, but the things closer to the edges were increasingly shrunken and warped. Had to be, I guess, for everything to fit into a ball. It reminded me of a poster that one of my roommates had in college, a picture by some Dutch guy showing an endless number of devils and angels squeezed into a disk.

In the middle of the ball was the Hog Heaven parking-lot with the asphalt and a couple of parked cars. My Lincoln Navigator. Since the ball was Spaceland, and Spaceland was my world, that meant I wasn't looking at a *view* of the lot, I was looking at the actual lot itself. Our motel rooms were off to one side, with, ugh, Spazz and Jena still going at it. She and I never had sex for that long.

Quickly looking past those two, I saw that squeezed in beyond the rooms was the Texas Texas casino next from door, all bent and miniaturized. And shoehorned in behind that was — no way — the north part of the Strip, not to mention all of downtown Las Vegas and the deserts and mountains beyond that, and even the fat curve of Mother Earth — everything getting tinier and tinier near the edge. And looking up towards the top of the ball, I saw the Moon and Sun inside it, and the stars as well.

"Spaceland," repeated Momo. "Your universe." She floated towards the ball; apparently Momo could fly. The pink flesh of her arm unfolded through an odd series of angles and she tapped one side of the ball. The central view shifted in response to her touch. The view started with a slow crawl through Vegas, passing right through some of the casino rooms, picking up speed as it reached the edge of town. Cactuses and mountains flew by, dimly lit by the moon. And then things were moving so fast they were blurred. The view slowed back down, passing through some South Bay traffic, Momo still guiding it, homing in on my neighborhood.

And then, there in the middle of Spaceland was the friendly interior of my house, lit up by the kitchen light Jena and I had left on. Momo set me down in there. I was home. Me and a metal case with a million dollars in it.

***

"Crush them!" shouted a voice somewhere in the distance. And now Flatland started shrinking; the distant expanses of it came collapsing inwards from every side, squeezing the whole world into an iron-rimmed disk, the shapes in the middle of a normal size, the shapes near the edges squeezed smaller and smaller. The Flatlanders were boiling down the streets, all heading for Ed's house and making siren noises. The three-dimensional space around me was collapsing as well, squeezing in from every side, and the noises of the alarms were getting louder —

Heaven-Earth-Hell Model

We were floating in the funny higher space that Momo lived in. The All. It was uniformly bright, lit from no place in particular. Apparently there was air, for I could breathe the same as before. I thought I saw some things like white clouds high klup above us. The Kluppers' cities? If they looked like angels, it figured they lived on clouds. Mankind's legends had gotten a few things right.

****

I looked klup and saw a cluttered haze of stuff. Further off in the debris hung great white clouds. Though it was very hard to judge distances here, it looked as if we'd drifted to within a few miles of them — but now our motion had stopped. We were stalled here; with Spaceland and its tiny stars and planets below, and the clouds of Klupdom above. All around us was four-dimensional space, filled with air and glowing light. The light was like the glow of a neon tube: it came from everywhere. I noticed some small pale bits of stuff nearby, little lumps the size of dinner rolls.

****

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We flapped towards the closest of the great pale clouds, which turned out to be a great growth of vegetation, a kind of floating island in the well-lit air of the All. It was shaded in beautiful pastel colors, with curves and surfaces leading this way and that in the four dimensions. Far from being smooth, it was as bumpy as a cauliflower, and with extra branches stemming off from the insides of every piece. I noticed some dark spots moving near it: other Kluppers. They must have known we were coming, for they flew out to greet us.

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Pucker Scale

We continued our dizzying klupward acceleration and now I could make out the great curve of Mother Earth. Beyond her swung the Moon and Sun; the inside of the Moon dark and stratified, the interior of the Sun like a nest of bright snakes.

****

I looked dron towards Spaceland — and was shocked to find that we'd drifted so far klup that once again I could see the whole of planet Earth, her wonderful blue-green-white mottled ball impossibly distant. Thanks to my subtle vision, I could see inside our planet as well: her dark inner rocks and glowing orange core.

"Don't let us get so far away!" I said to Momo. "I want to go back."

"It's quite an effort for us Kluppers to approach Spaceland," said Momo. "Only my family can do it, and even we can only manage it once every thousand years. The fabric of the All is very wrinkled near Spaceland, you know. Like the skin beside a scar. One might say that there's an excess of space near Spaceland, and this makes it natural for things to drift away. It flattens out a bit at the end of every Millennium. A cosmic tide."

Projection Details

Later one of the Kluppers would tell me that my third eye was seeing the whole continuum of three-dimensional spaces that were stacked up vinn and vout in fourth dimension, with each space collapsed to a different plane of the three-dimensional image inside my third eye.

***

It crossed my mind that I was able to move what the computer graphics guys called the hither and yon clipping planes. Remembering those words made me feel proud, they were among the few scraps of computer graphics terminology that I remembered from a course I'd flunked — the last hard-core computer course I ever took. The idea of 'clipping planes' is that you can look out at a scene and render only the objects that lie inside the slice of space between the planes. Calling the clipping planes 'hither' and 'yon' was some old-time hairball computer hacker's idea of a witticism.

Antenna crystals

About then Voule appeared, carrying a hypercubical box filled with hyperthin sheets of plastic. The sheets were dotted with little round dollops of a hyperdimensional substance that glittered like silicon. Like tiny glass cookies sitting on a tray.

"These are your Mophone whiskers," said Voule. "They're hypercylinders with a hypercone drilled into the vinner end."

"Cool," I said, not that I had any idea what he was talking about.

Voule took out a sheet and peeled off one of the round things. To my normal eyes it looked like a ball, but my third eye could see that it extended a slight amount into the fourth dimension. A continuous trail of balls. A hypercylinder. The hypercone deal had something to do with the fact that the balls at the vinner end were hollow in the middle, with the hollow part bigger growing bigger as you moved further vinn.

"Look closer," said Voule, handing me a four-dimensional magnifying glass that resembled, loosely speaking, a ball on a stick, not that I bothered to waste any time trying to think about that.

Peering through the hyperlens, I could see that there was a little piece of optical fiber embedded in the voutmost sphere of the hypercylinder. The fiber's end was flush with one of the sphere's sides. Relative to the space of my body, the whisker disappeared near the middle of the sphere, but my third eye could see that the fiber had a vinnward bend in it there. Beyond the bend, the fiber ran along the vinn/vout axis of the hypercylinder to stop at the center of the first of the hollowed out spheres at the vinner end.

"I've machined these all to have the exact same vinner offset," said Voule. "There's ten thousand of them on these sheets. Momo will set them down into Spaceland with you when she takes you back."

Jena Mourns

Though the ball's surface was a black mirror around me, I could use my third eye to see past it. There was pandemonium in the Coffee Roasting. Jena was tearing her hair and sobbing and shouting my name. Good. It was almost like being at my own funeral.

Deflating Description of Drabk

The overall effect was of someone old and wise and sly. Either that or he looked like my high-school janitor.

Looking into the Coffee Roasting for Jena

I had a flash of trying to imagine ever reaching that level of comfort in my own skin, trying to imagine success. God knows I had few enough role models in my own family, with my crazy mother and my father a clerk in a rooming house. The only thing my father had owned was his comics collection, and he'd ended up selling that to help pay his doctor bills.