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An Introduction to Differential Topology. Venice. 1979.

The most heterogeneous ideas are yoked by violence together; nature and art are ransacked for illustrations, comparisons, and allusions; their learning instructs, and their subtilty surprises; but the reader commonly thinks his improvement dearly bought, and, though he sometimes admires, is seldom pleased.

Samuel Johnson: *The Life of Cowley.*

(i)

We took the walk along the beach. There was some sun, and an uncertain breeze. Winos hung around the benches, talking shop. There were fishing-boats out on the water.

The girls were beautiful. I said something to him about it. He laughed. "You should be here in the summer," he said. I muttered something about leaden underwear.

A girl on a bicycle came toward us and passed, grinning broadly. — Long brown hair, short suede jacket, some kind of jeans skirt. — I turned to look after her. She was looking back over her shoulder at me. — *Integritas, consonantia, claritas.*

"She was smiling at you, Garbonzo" he said. It seemed an accusation.

"Must be the hat," I said. I tugged at it, self-conscious.

(ii)

"You still smoke Camels don't you?" he asked.

“Yes,” I said. Art and disease. “This week for some reason they’re Lucky Strikes, but usually they’re Camels. Yes,”

“And that Army jacket, you used to wear that all the time?”

“I wore it to a party at Halloween”.

He laughed.

(iii)

At the coffeeshop we took espresso with rolls, and talked about getting rich, or at least solvent. Teaching at the free schools seemed an obvious hustle. — “Heidegger,” I said. “It was Stefano’s idea actually. The Indian stuff is played out. So we corner the market for German Idealism. It’s murky, it’s Aryan, it has the vocabulary.”

“I like it,” he said thoughtfully. “I like it.”

“Come on,” I said. “*Angst? Geworfenheit?*”

He laughed. “Well.”

“*Selbstsein?* Come on, Richard, this is the fucking *Age of Selbstsein.*”

“Really,” he said. “Really.” He thought about it. “But why not teach a course in Wittgenstein? Seriously.”

“It is an easy name to drop,” I conceded. “But one difficult to attach to any doctrine which can appeal to the cult of self-actualization. There is the contribution to the philosophical theater: the hut in Norway, the notebooks in his rucksack as the shells whistled over his head in the trenches; the retirement in Austria, schoolteacher, gardener to monks. Well and good. But even this won’t sell the problem of the relation of

logic to ontology.”

“True.” He frowned. “Perhaps Heidegger would be better.”

I shrugged.

“But really what you should try is computer theft.”

“What?” Cognitive dissonance.

“No really I’m serious. Do you remember Grossmann?”

“The lapsed physicist.”

“Yes, well, he’s some kind of programmer now, and he works at a bank. Not that he steals anything, he doesn’t have the imagination, but anyway, I couldn’t do it, but you could. You should do it. I’m serious.”

“Right,” I said. Laughing helplessly.

“No really you should.”

“Right,” I said. Still laughing. “You handle the numbered account in Zurich. I’ll wire Exxon straight into it. We’ll buy a little country somewhere, nothing ostentatious, something with a good beach and a southern exposure. You’ll keep a villa by the sea, with a brace of Ferraris. I’ll have a Gothic castle in the mountains of the north, and a laboratory for my Forbidden Experiments. — Some alchemical apparatus, a few nubile serving-wenches, an assistant named Igor...”

“A graduate student, of course...”

“Of course.” Laughing. “Of course. They drool, to be sure, but...”

“... one can’t do without them. Really one can’t.” — Curiously thoughtful. — “But must he be a hunchback?”

“A polio victim perhaps. He walks with a limp. Perhaps he affects a cane.”

“His hair, unkempt.”

“But his brow, noble. His expression one of transcendent sadness.”

“His dress is simple.”

“Though it is intimated his descent is aristocratic, that he was raised amid wealth and cultivation.”

“He is musical.”

“He has a gift for the harmonica. His repertoire is extensive, but he favors Bach and Scarlatti.”

“His habitation is a rude hut, not far from the castle.”

“Nearby is a garden, where he cultivates herbs.”

Abruptly suspicious. “He doesn’t keep bees, does he?”

“No,” I reassured him. “But he is gentle and articulate, and communes with animals. It is said that he has tamed great numbers of wild birds.”

“He is fond of Schopenhauer.”

“And Heine.”

“But not Rilke.” He frowned. “No, he doesn’t like Rilke. Though I’m not sure why.”

Hands in my pockets, listening. He wanted more children. "Or at least one? You know?" She didn't understand that. — I laughed. — "What?" he asked. — "Nothing," I said. — "Too blonde," I said. I wiggled my toes inside my tennis shoes. "Entirely too blonde."

(v)

I'd met her earlier.

"You drove out here?" she asked. "Just like that?"

"Yes," I said. "Just like that."

"Wow," she said. "That's great." She made a note upon a piece of paper. "That's really great."

(vi)

Just like that.

I'd stopped for gas in Bernal, at a little shack with a Texaco sign, talked about the weather with an old Hispanic guy. — A toothless grin. He smelled of whiskey. — The strange procession of red and yellow vintage two-seater Thunderbirds I'd passed going south on I-25. — The dreamlike quality of the freeway at night, how I had seen an exit for Saint Anselm Road, in Arizona, just over the border past Gallup, in Navajo Territory, and thought it was hallucination until I found it on the map afterward. — The emptiness of the Southwest. The realization that came over you, driving through these endless vacancies, that you understood why the Indians had had to invent peyote.

Just like that.

An existential shudder. — The silence of these infinite interstates, it frightens me.

“... and it’s that much worse, you know, because, you know, I have these teaching jobs, but none of them is really very stable, I send out résumés all the time, but what can you do? it’s not like Caltech, I mean they paid really well, no matter how weird the place was, I wondered how you could stand it though I guess of course you couldn’t, that house you liked, we owned it, though we sold it, obviously, and now I don’t know, I really don’t. — It’s all right being a janitor isn’t it? I mean it leaves you time to think.”

I assured him it did.

“Because I wonder about that,” he said. “I mean, what I could do. But then it occurred to me that I could always be a chauffeur. You know? Wear a uniform, and drive some rich guy around. Because I know Los Angeles like the back of my hand, I’ve lived here all my life, and I could do that, I really could.”

“A friend of Scott’s did that, it didn’t sound bad. He repeated his mantra, you know, he had some guru, he did it all the time, for the positive karma, right, and that was what came of it, he got that job.” — Laughing. — “It was funny because he talked about it as if these were the cash benefits of meditation, right, but it really didn’t sound that bad. Once in a while he’d have to drive his millionaire somewhere, but the rest of the time he’d sit there in the car, you know” — patting at the top of my head — “with his little cap on, I mean, I saw the uniform, but he’d sit there in the car and smoke dope. I liked the sound of it. You could write.”

“He smoked dope?”

“Oh yes, certainly, in fact I think it was the millionaire’s dope. Seriously, I never saw this guy without a joint in his hand. He lived with a couple of other hippies in a house in the Valley, we called them the

Fabulous Furry Freak Brothers, I wonder what's become of him." —
Laughing. — "Maybe he works in a bank now too."

He laughed. — Paused, thinking. — "But really what we should do is
go to Guatemala, Garbonzo. I'm serious."

I laughed. "All right."

"No really we should. I have family there. You'd love it there, you re-
ally would."

A compound lit at night by psychedelic neon. The grounds patrolled
by vicious dachshunds. Wagnerian disco playing from speakers hang-
ing from banana trees.

"But do you speak Spanish?" I asked. "I mean their Spanish. Because
I don't. Though I suppose I could learn."

"Oh yes. I do. You could. No, we should do it. We really should."

"All right." Laughing.

"Really," he said. "We can get a van and drive down there. You'd love
it there, you really would."

A pause. The brow furrowing. "But if we're going to do this we're go-
ing to have to get a couple of women, Garbonzo."

I laughed. I thought I could take care of the van.

(viii)

Staring out the window at the ocean.

Whitehead had laid great emphasis on Plato's idea of the Receptacle
— the nurse of all generation, the matrix upon which forms of matter

are imprinted. — This sounded like the elementary particle vacuum, actually, but I remembered also the absorber at infinity, the radiation sink. Light radiates outward from the source because of a choice of boundary condition, the retarded rather than the advanced Green's function. Which didn't necessarily seem entropic, but if you thought of the ether as an infinite box-spring mattress, then it seemed natural that energy would seek equipartition, spread into unoccupied degrees of freedom.

The laws of physics are reversible. But your voice goes out into the world and does not come back.

Or if it returns, is strangely altered.

(ix)

"How long was that, the other day?" he asked.

I looked at him, as if disambiguation were really necessary, and then looked away.

"Six years," I said. The motion of the Earth, against the fixed stars.

"That must have been strange," he said.

I laughed. "Yes," I said. "It was."

Exorcism can be dangerous. Heads may spin. Beware of projectile vomit.

(x)

He'd dropped me on the edge of campus. I'd wandered aimlessly a few minutes, a rat in a half-forgotten maze, before I stumbled across her car in a parking lot, the green MG with the old black California plates

— gone completely native, she drove four blocks to work — and oriented myself. After that it was all too easy.

I found her in her lab, holding court among the inevitable audience of geeks. The room fell silent when I entered. I guess they all knew who I was.

“Hello,” she said.

“Hello,” said I.

“Let’s get lunch,” she said. Bag in hand, heading for the door. I had to be removed at once.

“All right,” I said.

“We can go to Burger Continental,” she said. Walking rapidly down the hallway, making for the exit.

“All right,” I said.

“I’m about to have a breakdown.”

“I had a breakdown at Burger Continental once,” I said. “It’s a good place for it.”

We walked down California to Lake. I had to watch my feet, because — just like old times — I kept tripping on the lumpy sidewalk, but looking up I saw a duplex that seemed familiar.

“Didn’t I used to live there?” I asked.

“It was the one next door,” she said. — “I was there,” she added brightly.

I saw that she was right. The Germans wore gray, we'd humped each other black and blue.

"I've had one good day in three years," she said.

"No shit," said I.

Coffee on the patio, listening to her problems, processing shock and irritation. — Had it really been that long? — It was like the twin paradox, clocks running at different rates. I'd stepped out the door to unscramble my brains, and when I stepped back in I didn't recognize her. Was this what was meant by the nonintegrability of proper time?

I did recognize her problems, though. They were innumerable, insurmountable. As opposed to mine, which could be dismissed, as always, with a snap of the fingers.

"Don't you get bored, being a janitor?" she asked.

It was a strange question, and I gave her a rather strange look. Presumably the one the Grasshopper gave the Ant when he realized that even though she had just lost five of her six legs in a granary accident she was still trying to lay a delayed-gratification guilt trip on him.

"No," I said after a pause. "I work by myself. Other people bore me. I don't bore myself." The Cliff's Notes for my memoirs.

"I don't believe that," she said.

I shrugged. Like it made a difference.

"Nothing's irreversible," she said.

Ludwig Boltzmann had said different, and so might I have, but a bird in the tree overhead chose this moment to interrupt. A wet splash appeared upon my sleeve.

I put my hat back on. She laughed.

“As ironic commentary on the illusions of romanticism, I would have preferred something subtler,” I said.

She kept laughing.

(xi)

Staring out the window at the ocean. The boats floating upon it, like toys. The waves moved in, and broke upon the shore. — Huygens’ principle said every point on the wavefront was the source of a new wave. Why did they add up to an outgoing wave and not a combination of outgoing and incoming waves? Because the waves on the outside added up, and the waves on the inside cancelled out. — And why was that? It seemed to depend upon the distinction between inside and outside; between compact and noncompact. — Was it all topological?

I laughed.

“What?” he asked.

“Nothing.” Laughing. “The empty sidewalks on my block are not the same.”

“That must have been strange,” he said again.

“No shit,” I said.

“Well,” he said.

Staring off into space. — Not simply irreversibility. Something uncanny in the moment of recognition. — Gamov? — My love is of a birth so rare.

“What?”

“Nothing,” I said. “Have you ever heard of a Klein bottle?”

“No.”

“Well.” A pause. “It’s the simplest example, or nearly, of a nonorientable manifold.”

“Yes?”

I laughed. “A manifold is just a space.”

“A space?” The indefinite article.

“A set of points. A bag of shit, a bunch of grapes, it doesn’t matter what. Though you say a little more about its structure, what it means for two points to be close to one another. Then it becomes topology.”

“Really,” he said.

I sensed resistance to the method of abstraction. “‘Go on,’ said D’Alembert, ‘and faith will come to you.’”

He laughed.

“That’s still too general to be nice,” I said. “There are pathological examples of topological spaces. But a manifold is smooth. Something you might tape together with sheets of paper. Or mold from clay.”

“Really,” he said. “From clay.”

“Or you might think of shapes blown from glass. For that suggests the essence of the shape, you know, the shape alone, with no thought for its size, or what it holds, what stuff it is that fills it out.”

“All right,” he said. Beginning to get into it.

“You might think of the surface of a sphere,” I said. “Or that of a coffee cup.” With the obvious gesture.

“A coffee cup?” Amused. “With the handle on it I suppose.”

“Oh certainly,” I said. “The handle’s quite the best of it.”

“Why?” Puzzled. Regarding the object at hand.

“The hole,” said. The finger through it, wagging. “You can’t get rid of the hole.” Holding the cup up, staring at it. “You classify things, shapes, spaces in the abstract, up to smooth deformations.¹ So a coffee cup is any other coffee cup, or a doughnut or an inner tube for that matter, and a sphere is any other sphere, or flattened sphere, or plate, or bowl. But the coffee cup can’t be deformed into a sphere, or into a vase, say, with two handles on it, or a pretzel, say, blown out of glass. For in the simplest case you’ve classified the surface if you simply count the handles. Because when you make the handle, when you make the puncture in the clay, you work a certain violence on the object, you do something that isn’t smooth. You make one thing into another.”

“But you do that when you shape the clay.”

“Not in the same way. There is a distinction.”

¹ Not quite the right word. But never mind that now.

“Yes,” he said. “I see that there is.” — Staring at the coffee cup. Philosophy begins with wonder.

“But these,” I said, “the surface of the sphere, that of the coffee cup, are orientable manifolds. They have an inside and an outside.” A pause. “This is related to the distinction between the right hand and the left. There’s a mention of the problem in the *Tractatus*, a reference to Kant. It’s a kind of paradox, because the right hand and the left are congruent, mirror images” — I held them up for his inspection (where had the tremor gone? this time last year they would have shaken) — “but no motion in space can carry the one into the other. If you have a right-hand glove, and you want to put it on your left hand, you have to turn it inside-out. You can’t just pass it behind your back and then put it on. You have to cheat. You can’t walk through the looking-glass.” I laughed. “It’s more complicated than I am making it sound because it works differently in even and odd dimension. But bear with me.”

Staring at his hands. “Have you been reading Kant?”

“Handedness is called ‘parity’, in theoretical physics. — No, not really. That was your advice, actually. You said to wait.”

Looking up, surprised. “Really?” Thinking. “But that was good advice.”

I laughed.

“Well maybe now you should. But go on.”

I laughed again, and patted at the breast pocket of my jacket. — Brown battered leather, a handmedown, the gift of my sister’s rich boyfriend. It must have been fashionable once, or he never would have owned it; it must have fallen out of fashion, or he never would have given it to me. Since then I’d been relentlessly wearing it down to punk. — In the breast pocket I kept a small black notebook, a minia-

ture ring-binder. I'd had it since I was nine. It had, of course, acquired a kind of sacramental significance, and had been retired for years at a time, too precious to be risked in ordinary use; having been the receptacle of my first tables of the planetary orbits and rocket engine design parameters, pi to five hundred places (at fourteen), a dream journal (at seventeen — not of course in homage to Freud, but rather J.W. Dunne, attempting to gather evidence for precognition) — it came in and out of use, periodically; and here it was in use again. It held this time a few addresses, some notes on the intrinsic geometry of field theories, and several long lists of books which as usual I couldn't find in the university library.

There was a blank sheet of paper folded up and bound to the back cover with a paper clip. I took it out, smoothed it upon the tabletop, and introduced a new and sharper fold which allowed the removal of a long rectangular strip. Then I held up the strip between the thumbs and middle fingers of each hand, and gave him the look, roughly, that Bullwinkle gave to Rocky: Nothing up my sleeve.

"I take this strip of paper," I said, "and identify the ends in the obvious fashion." They merged. "I have a section of a cylinder. You see?"

"I see," he said.

"But," I continued, "if I pull the ends apart, and interpolate half a twist before I put them together again, I have something rather different."

"Yes," he said. "How curious." Staring.

I made the join fast with the paper clip. I hung the loop upon my finger, and let him look at it. "This is a Möbius strip, which is, roughly, half a Klein bottle. I'd have to be able to paste two of them together to exhibit that explicitly, however, and I can't embed that in three dimensions."

He smiled. "I suppose you can in four."

“Yes.” I put the strip down in front of him, and made a sketch on the remainder of the sheet of paper. — Then I thought better, and made a second one. — “Suppose a kind of chemist’s flask, with a long neck coming out the top and a hole left in the bottom. Then there are two ways to run the neck around and close the surface. One way” — pointing — “you end up with a torus, just an inner tube again, with a bulge in it. The other way you take the neck around to the wall of the flask, step *around* the wall” — pointing, laughing — “and run the neck through to the inside of the flask, and match the hole in the opposite sense.”

“No.”

I laughed. “I’ll admit the glassblower might not like it.”

“No,” he said, “you can’t even visualize that.”

“Geometric intuition is something more than visualization,” I said.

“About that Kant was wrong. Remember? And you can draw it. Sort of.” Hand waving at the sketch.

“Maybe,” he said. Staring at the drawing. “Klein didn’t drink, did he?”

“Not from one of these.” Sleeping-draughts for overwork, one of those classic nineteenth-century breakdowns. Not unlike my own, come to think of it.

“No,” he said. Staring. “That is strange.”

“Yes,” I said. “For instance, you think it necessary for a surface to have two sides. But the Klein bottle only has one.”

“Yes.” Staring at the strip, the drawing. “How curious.”

“And so you can’t say which is the inside and which the outside. Thus ‘nonorientable’.”

“Yes,” he said. He understood it.

“You can see that on the strip,” I said. I held the join between the thumb and finger of one hand, and traced a path with the forefinger of the other. “If I begin here, say, and move along the surface to my starting-point again, I find I’m on the other side. But twice around —”

“— and you return,” he said. Staring at it.

“Suppose the strip were glass,” I said. “So that we identified the points, as it were, on the one side and the other. If I write something on the strip, a letter ‘a’, let’s say” — in fountain pen I did, it ran through and you could read it from both sides — “and walk it around the loop, it returns after one circuit to its starting-point, but upside-down and backwards. It becomes its mirror image.”

Suddenly suspicious. “Do you think about this kind of thing all the time, Garbonzo?”

“No,” I assured him, “I pass my evenings mooning after pussy, like anyone else.”

“All right,” he said.

“And I’m not even married,” I said.

“All *right*,” he said.

“But,” I continued — laughing — “suppose this letter were a little clock instead. If we send it around this little world, it starts out running clockwise and comes back running counterclockwise. You might interpret that as running backwards.”

Intrigued. “Could that really happen? if you went around the universe? Could you come back with your time running backward?”

“I don’t know,” I said. “There’s a problem with causality.”

He frowned. “I never liked causality,” he said.

I laughed.

“But could this really happen?” he asked.

“You assume not. Left- and right-handedness get mixed up in some kinds of elementary particle interactions, but not like this. It’s not like you walk around the world to wind up through the looking-glass. It’s local, not global, as we say. But there are some strange cosmological models. There’s one of Gödel’s, for instance, in which if you circumnavigate the universe you arrive in your own past.”

“Really?” Startled. “Gödel again?”

“Yes.” The crown prince of the mindfucker. “He wrote a little piece about it, in the Schilpp festschrift volume for Einstein. He begins by citing McTaggart on the unreality of time.”

“Really?” Shaking his head. “God, I don’t believe these people.”

“They can scarce believe themselves,” I said.

“You should write about this,” he said.

“All right,” I said.

A pause.

“So,” he said. Inviting the conclusion.

“So,” I said, “it’s like that, yeah. As if we’d gone round separate ways, and met again. Congruent with our former selves, but changed, you know, in parity. Her heart is on the other side. We’re strangers now.”

“Ah,” he said. “I see.”

I had tucked my right foot up under my left knee and forgotten about it; it was now half asleep. I stumbled slightly as I got up.

(xii)

We walked back along the beach. He had a favorite bookstore too. We leafed through little magazines, exchanging small opinions.

Then we sat by the pier for a while, and had a piece of the local color to tell us the story of his life. He wore an old green Army jacket; I thought he always should. The pockets were capacious, and held many cans of Coors. His tale might have proved a dull one, but his sense of plot was sure, and he varied, as our several moods required, the name of the woman, the label on the bottle. His twenty years upon the beach were thus as many minutes, perhaps a few more ounces, when quite suddenly he caught sight of a friend who bore a paper bag, and left as abruptly as he had come; warning us, over his shoulder, against the police. “Pigs,” he said. “Right, man,” I said. “Watch your back.” “I hope you got that down,” Richard said.

(xiii)

Then we tried a couple of galleries. Large colored shapes, like infant’s toys. We carried posters away.

I thought of my playpen, the letters and the numbers hung up upon a string, bright plastic reds and blues. The past was a receptacle; a bottle holding nothing now.

So I saw somebody famous putting up his show. But I didn't see the girl on the bicycle again.