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Editorial

An extraordinary neuroscience lab☆

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In 1987, when I was an undergraduate at Princeton University, I took a course called Brain and Behavior, Psychology 203, taught by Professor Charles Gross. I had always been interested in the brain, but I found this new course especially inspiring. The professor was an extraordinarily quirky person with a deep and incredibly detailed knowledge of everything brain-related. He spoke in a funny, charming, sometimes stuttering way with a thick Brooklyn accent, and had a zigzagging, almost stochastic way of walking as he moved about the chalkboard, drawing vividly clear but artistically terrible doodles of neuroanatomy. His vision on the brain was not technical or mathematical – it was profoundly intuitive. His accounts were full of deep principles and genuine insight, rather than merely the superficial clutter one sometimes gets in a science class. With one hand he wielded a broken piece of chalk, and with the other he grasped a sheaf of loose pages torn out of a yellow legal pad, on which he had written his lecture notes – but he didn't seem to need the notes to refresh his encyclopedic memory, except when he forgot how to spell something, which was often.

Toward the end of the semester, one day after class, I worked up the nerve and asked if I could join his lab as a research assistant. At first he seemed confused about who I was. He ruffled through some papers and said, "Graziano… Graziano… Oh, Hey, you're the A-plus guy. Yes! Let's meet! Let's talk!"

That was the beginning of my life as a neuroscientist. Through every step, for the next thirty-two years, Charlie was my mentor and friend. Most recently we were fellow faculty members at Princeton, our offices directly beside each other. I always knew when he was in because I'd be sure to hear his booming, vibrant voice through the wall. Charlie was the ultimate extrovert, exactly the opposite of me. I mainly live inside my head in my own private projects, working in my office with the door closed, observing the universe from a telescopic distance, while Charlie always lived in immediate connection to everyone around him with his door and his life wide open to company. Now that he's gone, his office, which as of this writing still has his name on the door, is horribly silent.

Charlie was arguably the most successful neuroscience mentor of the twentieth century. More movers and shakers came out of his lab than any other. Despite his self-deprecating impulses, even he used to admit that he was a great mentor, and I hope he's remembered for that contribution. I think he was the Socrates of cognitive neuroscience, always counter-culture, teaching his students how to ask insightful questions unencumbered by the latest group-think, and changing the world of neuroscience through a profound trans-generational effect.

I still don't really understand the secret mechanism of Charlie's lab. I certainly was never able to replicate it in my own lab. I suspect his success lay in his personality, and his personality was inimitable. He was extravagantly generous and engaging. He effortlessly gave his students a sense of vast personal potential. The unspoken assumption of the lab went something like this: although Charlie was the head, we were autonomous and capable scientists making our own discoveries, following our own creative impulses, each of us fundamentally self-reliant. There was no such thing as following in the wake of Charlie's scientific agenda. He didn't do agenda-driven science. His contempt for it was palpable.

He once said, with his typical humor, "As an advisor, if you're smart and know what you're doing, your students end up stupid. But if you act clueless and need help, your students show you how to do everything. They take over, and they end up smart." I'm still puzzling over how much of that comment was the usual Charlie self-deprecation and exaggeration, and how much was an extraordinarily deep truth. But all along, of course, the smart one was Charlie.

What can I possibly write to contribute to the memory of Charlie? I think many people – family, friends, students who spent time with him especially in the last decade – will keep the memory of his lovely and exuberant personality. Scholars have already written about his fundamental contributions to science. But here's one way I might be able to contribute: I can write about his lab. Much has been written about the people who made up the lab, and of course also about the science that was done in the lab, but nobody has written about the lab itself as a living space, and I find myself feeling wistful. A scientist's lab is a manifestation of his or her personality, and Charlie's Princeton lab, maintained for more than thirty years, was an extravagantly bizarre and yet welcoming place.

Imagine a museum curator reconstructing an ancient Athenian building where Socratic symposia were held. The walls and pillars, the benches and frescoes, the architectural spaces and mosaics, all give a haunting sense of the people who lived there. No detail is too small to be of interest. Maybe I can try an archeological approach and recreate the old Gross lab. For many of us, that lab was more than a home; it was an immersive environment. It was comfortable, bizarre but familiar, if that contradiction makes any sense. Lab members tended to inhabit that wing of the building close on 24/7, embedded in a kind of transparent gel of intellectual idealism. We worked there, ate there, entertained ourselves there, had internal lab romances, and sometimes even slept there. The lab has been gone for almost twenty years now – although Green Hall still stands, its insides were torn out and reconfigured for other purposes – but I can see every bit of it so vividly in my head, it feels like it must still exist in some Platonic world of the abstract. I can walk

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through every room in my mind and see every detail. Sometimes it's hard to believe that I can't just get up, walk in the front door, and see the place in reality like I did every day for so many years. I'm including a sketch based on an old architectural diagram (see Fig. 1). Sometimes you spend so long in a place that you never leave it, and Charlie's lab is where my intellectual heart is.

Maybe Charlie would have appreciated the non-paradigmatic nature of a story that makes a museum exhibit out of his lab. I can imagine him chuckling and then shaking his head skeptically, not entirely sure how to take the flattery, or hagiography as he might have called it with his penchant for unusual words.

When I first arrived in 1987, I had the impression of a vast shadowy past to the lab filled with mythical figures: Tom, Bob, Ricardo, and many other legends. Some of them I had missed by months, but they still seemed to belong to the Homeric prehistory. In my many years in the lab, of course, others came and went: Tirin, Mike C., Xintian, Maz, Shalani, Dylan, Nina, Kristy, and others. The whole lab family from beginning to end, members and affiliates, encompassed about two hundred people. But here I want to write about what the physical lab itself looked and felt like, around the time I first joined.

You entered the lab microcosm through the locked front door, and right away you were struck by the strange, institutional colors of the place, as if, in building it, the finishers had reached for some cheap leftover paint that was already in a supply cabinet. The walls were cinderblocks, like a jail or a bunker, and painted thickly in a grayish beige. The doorways and doors were painted a contrasting, pastel, greenish-aqua. (I've tried to recreate that color in the diagram.) The floor was made of linoleum square tiles, a kind of speckled light tan that poorly hid the dingy color of age. A dark brown linoleum crash-strip ran along the base of every wall. The ceilings, tiled in big off-white panels made of an unknown crusty substance, like giant pieces of lightly toasted bread, loomed quite close above, literally only as tall as the doorframes. If you jumped up too vigorously, your head would mash into those ceiling tiles and leave a dent (as I discovered). At intervals along the ceiling were tarnished, square metal gratings for airflow. Florescent lights in the angle between the wall and the ceiling, covered by long, curved, and sometimes cracked plastic casings, flickered down on us. That corridor, exceptionally narrow and low-ceilinged, could have felt claustrophobic, but to me it was as comforting as a home cave, a part of the warmth of the place.

To the right, immediately on entering the lab, you encountered the lunchroom. When I was an undergraduate and first allowed to work in Charlie's lab, my "office" was at the back of the lunchroom. I had a brown desk pushed against the wall, next to the big boxy white 1960's refrigerator. On top of the fridge was an old, plastic, Rockem'-Sockem' robot set, part of a background clutter of bizarre, trippy items. The lunchroom was lined with a largely-unused chalkboard on one wall, blue-green metal shelves screwed to another wall at shoulder height, and steel industrial shelves set against a third wall, the various shelves filled with random neuroscience books, notably atlases of the monkey brain, human brain, and rat brain, as well as a white plastic cut-away model of the brain stem. A cheap pale Formica-coated table in the middle of the room was the scene of the daily lunch carnage. If the weather was good, we'd eat outside around a picnic table behind the psychology building, but in winter or the rainy spring we mostly ate in the lunchroom.

The whole lab would crowd around the table, talking and arguing and politicking, sitting in mismatched chairs stolen from around the department. When I first joined the lab, the members were graduate students Jim and Earl, post-doctoral researchers Hillary and Paul, lab technician Linda, undergraduate me, and Charlie. Sometimes we brought our own food from home. Charlie almost always took out a big plastic vat of yogurt that he ate with his particular large metal spoon, the yogurt getting in his beard. Sometimes we bought gigantic long subs from Hoagie Haven. On Fridays, Hunan Take-Out had a lunch special, and we'd each get an aluminum, compartmented plate with rice, General Cho's Chicken, and sautéed Broccoli. All of us except Charlie, who cheerfully derided the Chinese food in a booming voice. As a foodie and a sinophile, he was somewhat snooty about Chinese cuisine and condemned our food as garbage. But he was also perfectly happy to taste large amounts of it while condemning it.

Tucked behind the lunchroom was the experiment room where Earl and Paul collected data. Later, I did many of my own experiments there: some of the peripersonal space experiments, and almost all of the

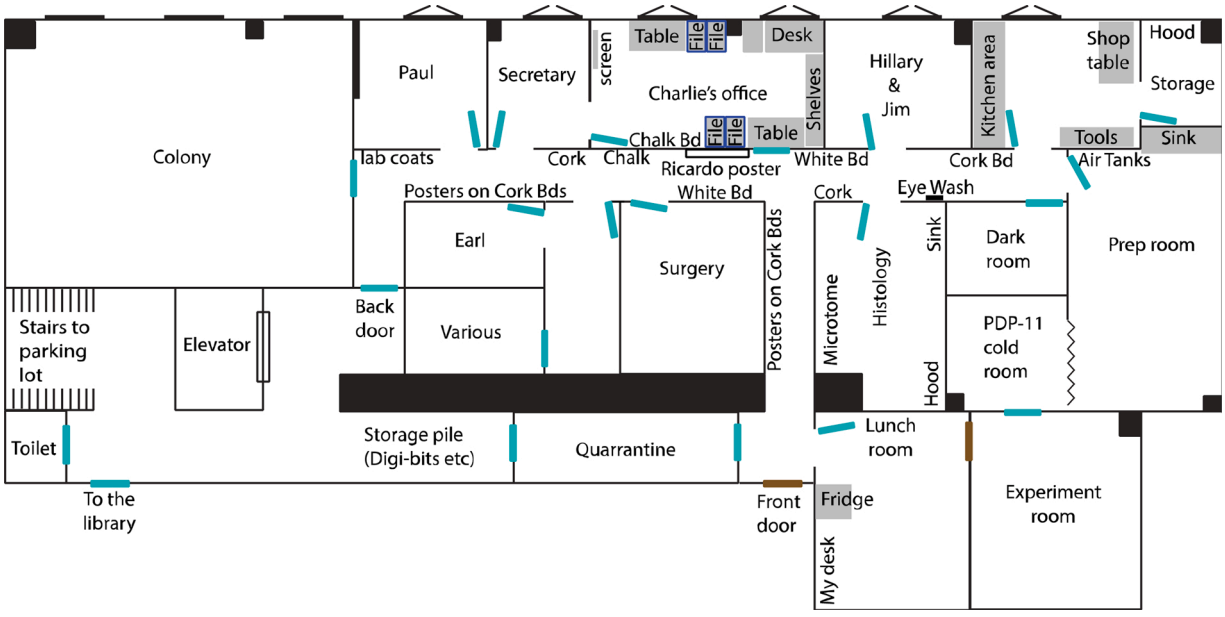

Fig. 1. Plan of the Gross Lab. The drawing is based on an architectural diagram and reflects the lab as it was in 1987 when I first arrived. The top faces east, the only wall to have windows. They are shown angled partly open, except for the windows in the colony, which were bolted shut, at some time painted green, then covered with black metal bars, and finally bricked in. The blue rectangles are doors, approximating the pastel color of the originals. The zigzag is a plastic, beige, accordion-style door. The blacked-in areas are structural pillars or plumbing spaces. Those who worked in the lab may see some discrepancies with their memories, since the space underwent modification over the decades. It was built in 1970, I arrived about halfway through its run in 1987, and it was pulled down in 2003.

electrical stimulation experiments. In the accompanying diagram, I've colored the door of that room brown for the sake of accuracy. The room had a make-shift, home-constructed feel, and the door was made of light flimsy wood, varnished, with a dented brass knob, as though picked up at the local hardware store. I remember the door as slightly warped, probably by weather, so that opening and closing it required putting pressure on the knob in a special, trick way. The equipment filling the room, the blinking lights and metal racks dripping with wires, relied on a giant, refrigerator-sized computer called a PDP-11. It was ensconced in its own special room, hidden almost like the Wizard of Oz by an accordion-style, folding plastic wall. The computer room had a massive, noisy air conditioner unit that was meant to keep the processors cooled. If you came inside from a meltingly hot Princeton summer day, drenched in sweat, you could always sit in the PDP-11 room and cool down, probably faster than you wanted to. When Charlie roasted a whole pig in a back-yard barbecue, we'd get the pig from the butcher in a giant plastic bag and store it in the PDP-11 room for refrigeration. Any modern smartphone must now have millions of times the processing power of the old PDP-11, but in its day it was a fearsome machine, a top processor, a data cruncher of impressive proportions. In the late 1980s, when I first arrived, it was already as quaint as a horse-drawn carriage, but neuroscience labs the world over clung to that model and brand because all the established programs had been written for it. In the early 1990s it was finally retired, wheeled through the narrow corridor, eased gingerly around corners to avoid knocking chips out of the concrete wall blocks, and parked in the junk pile in the back hall. Next to it was a strange dusty rack of equipment, a thousand times more ancient than the PDP-11.

"Those are digi-bits," Charlie said. "Those were expensive. We can't get rid of them."

I wish the rack of digi-bits was still around, because it belonged in a museum. The thing was a proto-computer, as astonishing to see as a proto-mammal from two hundred million years ago. It contained hand-soldered circuits full of crazy wires and vacuum tubes spread out over a series of galvanized metal panels. As far as I could understand, by wiring the panels together in a specific order, you could "write" a computer program to control your experimental apparatus. The machine was quite incredible, standing upright as large as a person, dusty and stuck here and there with hand-lettered labels. Charlie never threw out anything if he could help it.

The lab was organized like a T maze, with a short corridor serving as the stalk of the T and a very long corridor running along the top. The short corridor was fairly empty, with blank walls except for some large chrome ventilation grilles and two bulletin boards. The long corridor was busy. All the offices and most of the workspaces opened onto that corridor, as you can see in the diagram I provide. Because the lab was locked away from the rest of the building – both the front and back doors equipped with a heavy deadbolt and an alarm system, and the secret third route through the quarantine room forever hidden by stacked piles of old lab junk – that wing of the building became the insular world of our small family, and the long corridor became the physical center of our lives.

The corridor was so long, it was good for hall hockey. Sometimes lab members would put on roller blades, unscrew wooden broom handles from their respective broom heads, and play hockey up and down the corridor with a ball of regular notebook paper crumpled up tightly and bound with cloth surgical tape. The linoleum floor tiles had scratches and gouges from some intense hall hockey moments.

The walls of the corridor were cluttered and colorful with mounted photos that Charlie had taken on his exotic trips, a chalkboard with dozens of postcards stuck into the metal edging, a huge whiteboard with a full month of lab schedule laid out in a grid in Linda's block hand-writing, a row of white wooden pegs with old, scummy, heavily-worn lab coats hanging, and half a dozen scientific posters fixed to the wall, many of them thumbtacked to large cork bulletin boards.

The most enduring poster was the famed Ricardo Gattass work of art. It was a massive construction, almost floor to ceiling, made of inch-thick, white painted wood and mounted to the concrete wall with silvery screws. The text for the poster had been typed on an actual typewriter, cut out with scissors into little rectangles and glued onto the display here and there, although the glue had gone brown and crusty with age and was visible through the paper. The display showcased beautiful models of brain areas made out of copper wire frames. The idea was that an area of the cerebral cortex might be naturally curled up in a complex way, but if it could be duplicated in a copper frame that was hand-welded together, the frame could then be straightened with pliers, revealing what the brain area might look like structurally if it were spread on a table – like flattening the ball of the globe onto a map. Now-a-days a computer can manipulate a virtual model, but apparently in the two decades before my time in the lab, real wire models were the cutting edge of science. It reminded me of the physical models of DNA that were *de rigueur* in the 1960s. These copper wire frames were fixed to the poster with silver wire twists. The whole front of the poster was covered with a sheet of clear plastic, which, over time, ripped and came off in ragged strips. That monumental art collage, beautiful and outdated, enigmatic after most of its parts and labels fell off, remained in the lab screwed to the wall until the very end, when the wrecking crew came and turned the lab into rubble.

At the very end of the corridor, on the door of the prep room, someone had fixed a small corkboard and tacked up a Snellen eye chart. The corridor was so long that only the largest block letters at the bottom of the chart were visible from the opposite end of the hall. In the middle of the night, when I was working and needed a break, I would sometimes pitch a tennis ball down the hall and try to nail the Snellen eye chart. Because the hall was so narrow and low – I could touch both walls with my elbows, and had less than a foot of clearance above my head – it was quite difficult to pitch that distance while maintaining height.

When you grow accustomed to a house, you soon develop an acute sense of where everyone is by sound. The prep room door made a distinctive, metallic clatter like wind chimes whenever anyone opened it. The reason was a set of spare coaxial cables, hanging from a cable rack mounted high on the back of the door. The cables would swing when the door opened, their metal ends clanging against a pair of tall air tanks – a blue nitrous oxide tank and a green oxygen tank, stored against the concrete wall just behind the door and secured by a thick shiny metal chain. That clang was one of the more indicative sounds of life in the lab, especially on a quiet night. Another was the soft, rhythmic, *snick snick* of the sliding block microtome in the histology room. Another was the resonating, mid-register bassoon of Charlie's voice emanating from his office, during a phone conversation that was supposed to be private but that everyone in the lab could hear. Another was the quiet, fervent swearing of someone in the shop room trying to solder up a 32-pin connector and inevitably getting burnt by the soldering iron. A particularly bizarre household sound was the hooting, clapping, stamping and clicking, that sounded like a cross between a sex orgy and a dance party with castanets, coming from students in the prep room trying to determine if they had hold of an auditory response in an experiment.

The prep room was the scientific heart of the lab. Most of the old legendary experiments had taken place there, including the famous studies of face cells and biological motion detectors – the primordial origins of an entire modern field of study. Social neuroscience first woke up in the 1970s and crawled out from the dark warm nursery of the Gross lab prep room. I remember the room as a huge space, cavernous and dark, smelling faintly of leaked anesthesia, full of mysterious equipment racks and blue-green cabinets looming out of the shadows, the overhead lights always off because the experiments required visual stimuli to be back-projected onto a homemade screen. One of the most peculiar aesthetic features of the room was a brass lath, dirty with age, running around the wall at waist height and used as an electrical grounding strip.

The trick of Charlie's lab was to keep your mind open and look for unexpected results outside any established paradigm. Most scientists

were delighted to find a paradigm that could regularize their experiments and allow them to crank out auto-papers. Charlie didn't try to hide his contempt for that kind of paradigmatic science. The brain was full of unknown unknowns, and his approach to science was to use all of his creativity and flexibility to find out as much actual truth as he could. He used to talk scathingly of scientists who study their paradigms and equipment instead of studying the brain. As a result of this creative pursuit of truth, the experiment room was full of objects of surpassing bizarreness, accumulated over many years, in case any part of the brain might respond to them.

One drawer in the prep room, the second one down from the top, held a collection of plastic lizards, snakes, insects, dinosaurs, ferns, a plastic apple, a ratty bunch of plastic concord grapes, a single plastic grape stuck on the end of a long Q-tip, some plastic sushi, a life-sized rubber hand, a plastic Halloween wookie mask, a wig with auburn curly hair, and a plastic light saber. Another drawer was dedicated to toilet brushes of many shapes and bright colors. They were so vivid and had such hairy complexity that they made good visual stimuli. Sometimes nothing could beat a good toilet brush brandished in the hand, for driving neurons in the upper levels of the visual system. A third drawer was stocked with enlarged photos mounted on cardboard. The photos were mainly of faces, monkey and human, as well as some very bizarre scrambles where a face had been cut into squares and randomly rearranged. The photos could be fixed by a spring clip to the end of a brass wand and presented as stimuli. A fourth drawer was filled with textures – hairy fabrics of vivid, shocking colors, a few yards of black felt, and some paisley silks.

Social neuroscience was born into the world at that moment when Charlie first discovered cells that respond specifically to the sight of faces. Consequently, many of the accumulated stimuli in the lab related somehow to faces, and one of the glass-fronted cabinets was dedicated to an array of heads. The most vampiric head in the cabinet was a molded, white, Styrofoam wig-holder, on which someone had drawn monkey fangs and stuck in black thumbtacks for eyes. In the darkness of the room, this wig holder was easily the spookiest object in a menagerie of curiosities. Another Styrofoam wig-holder was equipped with a semi-realistic, plastic face stapled to it, a dapper-looking gentleman with dark hair, pink skin, and a full plastic mustache. Sometimes the curly, auburn wig ended up on him. A third head had been removed from a stuffed toy monkey. To keep the stuffing from leaking out of the severed neck, someone had sewn it shut with 2.0-gauge black silk suture.

To test for auditory responses, we used a child's noisemaker toy. It was about the size of a silver dollar, made of painted metal, and crafted into a yellow bear wearing a blue baseball uniform. If you squeezed the right spot, it made a loud metallic click, which was often an effective sensory stimulus. For some reason – I don't remember why, but maybe because of my own auditory experiments – the clicker ended up in my desk drawer and stayed there long after it had any useful function. With every change of office, the contents of the drawer moved with me, and I see that I still have the Gross Lab stimulus clicker from thirty-two years ago. I'm holding it right now and it still clicks.

The offices, arranged along the East wall of the building, were the only rooms with windows. They could be hinged outward, and looked out bleakly over a narrow grass verge with some scrappy rhododendron bushes and, farther out, a large parking lot. Members of the lab didn't look outward much, except to check if the university police were handing out tickets, and then everyone would shout and scramble outside to vacate the convenient but illegal parking spaces. Mostly we were focused inward on the lab itself.

The emotional, scientific, ethical, and inspirational energy of the lab emanated from Charlie's office at the center. I apologize if I'm about to go even more overboard on the details, but they somehow conspire to make the place. Besides, I get to show off how photographic my memory can be. For the remainder of this piece, I want to try to capture what used to be an ordinary weekly moment, attending a lab meeting in Charlie's office. I won't try for anything profound – I wouldn't know how. I just want to grasp hold of a moment.

The lab meetings made for cozy gatherings – seven or eight people, depending on who was cycling through the lab, crowded together into one bubble of personal space, talking, arguing, laughing, occasionally bumping elbows and knees, swapping human warmth and lunch breath. I spent so much time in Charlie's office that every detail is still in my head. Unlike in the rest of the lab, the walls here were painted a very pale blue, almost white, which gave the space an indefinable, open and airy feel. The office had two entrances, but one (more toward the right in the accompanying diagram) was blocked off with a table and never used. Someone put a poster on that door showing Bruegel's painting of the blind leading the blind. Charlie used to joke that it was the motto for the lab. The other entrance to the office, through a little vestibule where the secretary sat, was always open. The whole lab had an open-door policy. We never closed our office doors except at night when we left, or for the occasional private phone call. One reason for the openness was the strong feeling of security. The lab was our home, its outer perimeter locked and safe. But I think another reason must have been the openness of Charlie's personality that rubbed off on the rest of us.

The chairs in the office were miscellaneous lab stools and office furniture, variously green, orange, dirty white or sky blue, sometimes a little sticky on one's legs where vinyl upholstery had been repaired with duct tape. They were packed so close around the edges of the little room that the arms and wheels would clunk and catch against each other. On the floor was a rust-red rug with geometric designs and a knotted, white string fringe that had gone gray with age. The chalkboard, old and speckled, with bits of broken chalk and thick chalk dust in the aluminum trough, was mounted on the largest section of free wall, in case anyone needed to draw an idea during a lab discussion. The aluminum chalk trough, having been hit by the hard backs of too many chairs, was loose and beginning to break away from the board. A very large poster encased in a clear plastic covering had been thumb-tacked to the main door, and was visible from inside the office as long as the door was swung against the wall in the open position, as it usually was. The poster contained an elaborate, black ink drawing of an Indian god with a devilish face, sitting on a carven throne, grimacing horribly and having sex with a woman who was perched on his lap, her back to the viewer. The drawing was stylized and filled with swirls and action and testicles. A little projection screen about two feet across was fixed to the wall next to the open door. Sometimes the screen was used when students gave practice talks, but more often when Charlie showed slides from his latest trip around the world. The screen was one of those old-fashioned, pull-down gizmos, but the spring mechanism had malfunctioned and the screen wouldn't stay in the down position, no matter how hard you pulled the handle. To solve the problem, Charlie had hung a hunk of metal on the handle, a 0.5 kg weight from an old-fashioned scale, tied on with a bit of green insulated electrical wire and clipped in place with a small-sized surgical towel clamp. The projection screen had a tear near the upper left corner, the fabric curling at the edges of the tear, revealing its layers of black backing and white surface. A mountaineering pick from Nepal that someone had given Charlie on his travels, made of weathered wood and rusty metal, leaned in the corner under the projection screen. A homemade wooden box, varnished, the dark brown varnish crumbling off, rested on the floor in the corner near the icepick, and held the cardboard panels of old posters from previous scientific meetings. Over the years the glue had dried and much of the paper labels and graphs had curled off, leaving behind sheets of cardboard with characteristic brown Xs of dried glue. These loose bits of cardboard and paper were crammed into the wooden box, and the glimpses of graphs from mysterious posters past would intrigue me, as if I were looking at a fossil bed worth excavating someday. Framed on the East wall between the two windows, a photo showed a woman from East Asia, a close-up of her upper body in half profile. She was wearing what looked like a red felt shirt and a gray cloth wrapped around her head. Her country was unclear. Her face was chiseled, with black eyebrows and piercing eyes, a striking photo. The room contained five metal file cabinets. A short blue

one was pushed up against the left side of Charlie's desk, and formed a continuum with the surface of the desk. He kept his old grants in file folders in that set of drawers. Four tall, pastel-blue file cabinets flanked the middle of the room, two on each side. They contained his collection of scientific reprints, often with a bit of paper sticking out from an imperfectly closed file drawer. On each reprint, he would draw a quick pencil line under the author he considered most memorable or important, and file the paper under that author's name. If you ever saw a reprint in the lab with a pencil line under an author's name, you knew it belonged to Charlie's collection. Each of the blue file cabinets had a small, protruding, chrome-colored lock near the top. One had a silver key stuck in it, in case Charlie wanted to lock up the files, which never happened. On top of one of the blue file cabinets stood an antique steel-and-brass balance in a glass case, with a set of metal weights – one of which had been used to fix the projection screen. I believe the vintage scale was a gift from one of Charlie's own mentors years before, although I never got the whole story. The circular metal garbage can beside the desk, slightly rusty, had once or twice caught fire after Charlie put out a cigarette. In earlier years he tended to smoke when stressed, or when preparing for lectures, though rarely when anyone was in the office with him, and in later years he wisely gave up the habit. The dark-brown, faux-wood surface of his desk usually had a Macintosh computer, a pile of books, his big metal yogurt spoon, a metal cup with a welded handle that he used for water, a hand-crafted leather mug with a supply of yellow pencils leaning from the top, an electric pencil sharpener into which he spasmodically jammed his pencils, sometimes the distinctive white cardboard soup pint from Cox's deli leaving chicken-soup rings on the surface of the desk, his leather book satchel that looked something like a saddle bag, and his little black memorandum book that he called his mind, strapped closed with a rubber band. If he misplaced the memorandum book, he would stump around the lab saying, "I lost my mind. Did anyone see my mind?" The front of his desk, the forward face of the drawers, was dark blue metal with chrome handles, the drawers sometimes pulled slightly open to reveal a chaos of papers, paperclips, pens, and old spoons. A small cork board on the wall, just to the right of the desk, had art prints or calendars pinned to it. Book shelves, fixed to the upper part of that same wall to the right of the desk, were made of varnished wooden planks on steel brackets, and contained long rows of black-bound theses, the intellectual offerings of many previous graduate and undergraduate students, as well as Charlie's own graduate thesis from Harvard bound in green cloth. On the rest of the shelf space, in no order, Charlie had stuffed a miscellany of books, the old color-coded abstract volumes from the Society for Neuroscience, a collection of past Charlie minds in many colors, books on art, books on bizarre topics. For a long time he had a college textbook on sexual practices in the US, with artists' illustrations. He had a book by Karen Horney on Feminine Psychology and a book by John Houghlings Jackson on neurology. Just below these long wall-mounted shelves was a small, free-standing bookcase against the wall, made of darkly stained wood with compartments and a cheap particle-board back. Sometimes his satchel or his mind sat on top of that compartmented bookcase, along with random books and loose papers, or yellow legal pads on which he always wrote his lecture notes. On it, he also had an old, 1960s-looking, boxy brown radio, typically tuned to a classical station. The tables in the office were surfaced in cheap, silver-gray or dark brown Formica, the thin layer of formica peeling off at the edges and showing a reddish granular layer of glue beneath. The tables were often cluttered with old, cloth-bound library books and Xeroxed papers and enlarged photos, or with strange objects brought back from exotic travels, like carved wooden masks dripping with ropey hair. The venetian blinds on the windows, made of wide, off-white metal strips, grimy at the edges where they had probably never been cleaned, were usually pulled up crookedly to the top of the window to let in the light, the dingy rope mechanism straggling down one side of the widow and spilling onto the table beneath. If the windows were angled open in good weather, the chirping and warbling of sparrows and the occasional caw of a crow would drift in with the subdued sounds of Princeton traffic or the hourly tolling of church bells from the corner a block away. Sometimes the branches of the rhododendron bush just outside the window would shudder from a sudden squirrel. In summer, we'd smell cut grass from the narrow verge under the window, or the strong dark odor of the woodchips that later replaced the grass, or the odor of rain and mud in the wet Princeton spring, or maybe that distinctive smell of chicken soup from Cox's deli. Usually the soup came with two saltines in a plastic package, and Charlie would tear it open with his teeth and stuff the crackers in his mouth, the crumbs scattering over his beard, shirt, and shorts. During the meeting, Charlie would sit at one end of the office hunched or sprawled in his desk chair, dragging the chair closer to us by a characteristic rowing movement of his feet across the rug. The chair was a piece of 1970s, university-issue office furniture, boxy, with a shiny chromed metal frame on four wheels, and a square red slab of cushion for the seat and another slab for the back, upholstered in some kind of nylon coarse fabric. The fabric was slightly ripped at one of the seams, pale foam stuffing coming out, and a spot on the armrest was darkened and melted from an old cigarette burn. Charlie took up more space than anyone else, and not just because his personality was larger than life. He sprawled and squirmed and twitched so much that he needed the extra space. His deeply tanned arms and legs seemed to go everywhere. For about a year, once, he wore a necklace made of acorns. After he ran the New York marathon, he kept the participation medal around his neck on a blue ribbon for months. He often wore a plaid, short-sleeved, button-down shirt with a breast pocket, the fabric tight over his barrel chest and the round of his stomach, tucked into a pair of blue-gray elephant-colored shorts with a leather belt, along with a pair of old, worn, warped, Birkenstock sandals on his otherwise bare feet. His toes were often glaringly bruised, the toenails crooked, from running marathons. We all politely tried not to look at his feet. His chair rattled every time he jiggled, crossing or uncrossing his legs, gesticulating, looking startled at someone's comment, making a vigorous comment of his own, his bushy hair and beard vibrating, his dark-framed glasses glinting in the light from the window. "Oh God, there's umpteen million experiments on that quantitative mash! Don't tell me you want to do one of those now!" He was always strictly honest, his speech machinery wired directly to some genuine center, free with praise when he meant it and willing to slit the throat of an idea when he felt it deserved slitting. He was always self-deprecating but never modest. He was full of emotional vibrancy, a potent psychological immediacy, even when talking about some minor technical feature of a scientific paper. When he made a point, he often reached forward in a characteristic way, his hand shaking slightly with eagerness, not with a finger extended in a stereotypical, "hear my point" gesture, but instead with his fingers slightly curled as if he were reaching for a small cookie. When he laughed, it was a surprisingly quiet laugh given his normally booming voice, but he was so invested in the laugh that sometimes tears would come out and he would have to take off his glasses and wipe his eyes with a multi-colored, tie-dyed handkerchief that he pulled out of his pocket.

Thirty years later, I'm still at that lab meeting.

I think I better stop now. I know I haven't said anything profound about the man or his fundamental contributions to science. I'll have to leave that to others. All I wanted was to capture a moment – the feel of a time and place, and an image or two.

Michael S.A. Graziano
Department of Psychology, Princeton University, United States
E-mail address: graziano@princeton.edu.