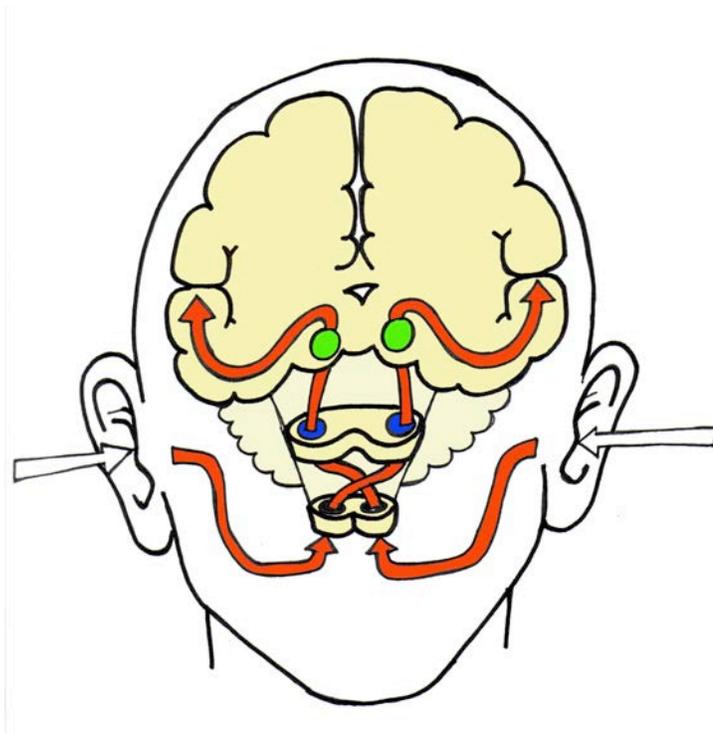


God and the middleman



Bruno van Swinderen

I first heard of him when I was an undergraduate at Brandeis University. I was putting in the hours working in Jeff Hall's lab, pushing fruit flies around for a work-study paycheck. The Hall lab was a wonderful place at the time. It felt like a second home to me, away from the anonymity of college life. I'd walk away from the solitary wastelands of crowded cafeterias where I often sat alone, away from those rich boys and girls from Connecticut and Long Island, away from Funky Cold Medina dorms, to the *Drosophila Arms*. The sweet smell of molasses in the battered up old elevator ushered me to the welcoming world of fly people. There was Adriana, Argentinean, feisty, and funny; Mel, cranking up the CD player, Don with his old scones on the shelf, Brigitte, patient and conversational, and Jeff, the alpha male himself, extremely funny to me. I loved being there, and being respected as a junior fly guy, along with the gaggle of other undergrads who had found a haven there. One day, Brigitte mentioned his name. She said that he had been Jeff's first graduate student, years ago, and that he had thus always remained a favorite of sorts in Jeff's mind. I didn't hear his name again for almost a decade. Jack.

The next time I heard his name mentioned was again in connection to Jeff Hall. I was winding up my own graduate studies at Washington University in St. Louis, Missouri. How I ended up there was a bit of an accident, connected to Jeff as well. When looking for graduate schools, I asked Jeff where he thought I should go to study population biology. He emphatically said "Washington." It so happened that I had just heard about Washington University the day before, in an unrelated conversation with another professor, Chandler Fulton. So I applied to WU, got interviewed, accepted, and did my time. But I think, in retrospect, Jeff had meant the University of Washington, UW, in Seattle, where he had studied. But anyway, it worked out, and I was now sitting in a lecture hall hearing Jeff give a lecture on fly behavior; he was visiting St. Louis. After the talk, I asked him where he thought I should do a post-doc, fully aware of the potential impact his words had on my life. I wanted to work on consciousness, the big

questions, not narrow questions like calcium channel up-regulation. Jeff immediately mentioned Jack. He said that Jack had just moved to San Diego, to a place called the New Sciences Institute (NSI), headed by a guy called Fineman who was interested in consciousness. It seemed too good to be true, to work on flies at a place brave enough to tackle the big questions. I emailed Jack. Somehow already knowing my name (via Jeff), he invited me over for an interview.

I formed a favorable impression of Jack when I met him during my interview at NSI. He was tall, as he stepped out of the elevator, thin, a bit sick-looking, somewhat inscrutable. I had been encouraged by the often humorous tone he adopted in his review articles, which I read on the plane. I remembered Jeff Hall, that extremely funny but also extremely serious person I admired, his mentor from long ago. I gave a decent talk, Jack showed me around the institute, flipped on the switch to his flight arena. This last thing really impressed me, a small drum of green LED where images could be displayed, which a tethered fly could control by virtual-reality feedback from its wing beats. Jack didn't show me the real thing; he just turned it on and said what it was used for. I loved the idea. Later we had dinner at a restaurant in Carmel valley, and as he was talking I noticed the man had no eyebrows. This explained to some extent his inscrutability, I felt. I liked him, and felt very positive about working with him. He seemed easy-going and open-minded. I also met Dr. Fineman, the head of the institute, during my interview: erudite, unblinking behind a big desk, a major comb-over. I liked him too. He outlined the philosophy of the institute, that it was a non-hierarchical and horizontal, where ideas were to flow freely and unimpeded among an egalitarian set of scientists. It was ideal, and I signed on already in my mind that day, walking around. I loved the place, and I accepted the position.

Jack was mentioned a third time before we left for San Diego. I had done a rotation my first year of graduate school in Bob Waterston's lab, working with a post-doc called Pam. By coincidence, she had been Jack's only graduate student, at Princeton. I remember very clearly, the day I told her that I was going to San Diego to do a post-doc with Jack. We were at a Friday beer hour, munching on fritos. I had asked her what he's like, and she replied "Tall", without volunteering any more information. When I told her that I was excited about this, she seemed distinctly disappointed and said "Oh...", while

grimacing. It confused me, at the time, but not enough to change my plans. Graduate students sometimes get negative about their supervisors, after winding down 6+ years of drudgery. I had a good feeling about Jack: my childhood hero was a Jack, the honest natural leader in “Lord of the Flies.” Jack would be my mentor. Similar to when I applied to graduate school, I never diversified my options; this was my only option. Anja and I would drive to California, freshly married and with a baby about to be pulled from the infinite. I didn’t really know Jack, the salary was bad for a family in San Diego, but I wasn’t worried. Happiness does that to you, you don’t interminably weigh options, costs, and benefits. You just do, knowing it’ll be fine.

I found Jack to be a distant but likable colleague my first year. The beginning of my post-doc coincided with the birth of our daughter, Lena. This of course was associated with endless nights trying to calm a crying baby, helping gas come out by bicycling her little legs. Anja became a stay-at-home mom, with virtually no contact with anybody for that first year except me and the screaming baby. We shared one car, me taking the Mexican Nanny Express (the city bus) once a week. We were so proud of having Lena and how beautiful she was. Meanwhile, at work, I was trying to settle in. Jack had three technicians, Sunny, Suzanne and Ann. Sunny, was shy, Ethiopian. She spent long hours doing behavioral work with flies, I wasn’t exactly sure what. Suzanne, tall, friendly, and motivated soon left for other pursuits. Ann, short and unpleasant stayed, my immediate everyday colleague. I noticed that she seemed to be completely on her own, with her own unintelligible project. Jack was rarely in the lab, and she did whatever she wanted, it seemed. I suspect that she immediately viewed me as competition, as a possible hair in her soup of independent tech life. She was unhelpful and aggressive, even to Jack when he asked about her progress. I wondered about the next few years, me and Ann side by side, and was thankful for Anja and Lena waiting for me at home, cries and all. It struck me at the time, only slightly, that Jack never asked about my newborn child, this new life. We were invited to his house once or twice and met his voluminous wife, Jack’s opposite in every way. Jack had no kids.

I noticed immediately that a number of fellows at NSI, other scientists, did not seem to like Jack; there was a definite chill in the air. There was a clique of senior fellows, Carlos, Andy, and Evan, who undoubtedly gave him a cold shoulder. This

confused me; Jack was a nice guy. Their dislike of Jack seemed to transfer to me, his first post doc. It was almost as if something had happened just before I came, something awful, and they were all bitter about it, and it involved Jack. I didn't ask, and tried to get a project going. Jack was interested in studying gene networks in flies. How precisely he was going to do this was unclear. He seemed to have inherited a project from another fly person, George, who had recently left NSI, something involving bunch of double-mutants tied to the *Appl* mutation. This was not really a novel or exciting way of examining gene networks, but Jack seemed quite open to any idea in this regard. Within a couple weeks, I found a recent paper on epistasis involving something called the diallel cross, where you could determine interactions between genes by a quantitative genetics approach. I quickly dreamed up a set of projects involving diallel crosses and a syntaxin paralytic mutant. I was interested in the gene because I'd worked on it in worms during graduate school. I felt it was close to the target of general anesthesia, hence a possible back door to studying consciousness too. Imagine, looking at gene networks and consciousness at the same time! I had a project, somewhat contrived by the vacuum I found myself in.

I worked like a beast that first year, as a good post-doc should. The net consequence of getting a PhD was for me to sit interminable hours in front of a circulating water bath and count flies falling down test tubes as a consequence of heat-induced un-coordination. Hunched over, a stopwatch in hand, counting: four, four, eight, one; two, six, three, two; one, nine, three, nine; every ten seconds. The sevens, eights, and nines were tricky because you can't really see seven fallen flies at once. You see two which haven't fallen and do a quick subtraction to deduce the fallen. Having well greased this arithmetical faculty of my newly minted brain across several months of hard labor, I completed a suppressor screen. Throughout this time, I was pretty much on my own. It struck me how little input I was getting from Jack, genetics-wise. I devised the genetic schemes on my own, and Jack approved. I had to remind myself that he was the author of a well known genetics manual. But, in a way I enjoyed my independence. I did worry that I was a bit of a fraud, getting paid by the prestigious Institute to count fainting flies, supposedly to figure out how gene networks operate. I'd complain to Anja, wondering whether I was cut out for a scientific career, just the sheer boredom of it all. Then, I'd go dandle my growing little girl, work with Anja on our vegetable garden, eat home-cooked

meals, and be generally very happy, returning to my flies re-invigorated. I felt that I had a pretty different life than most of my colleagues at NSI. Few at the time had any kids, many were divorced or single, seemingly devoting all their time to work or sports. I was an oddball, with my sedate family life.

Before the first year was over, I got a new colleague, Tom. I was excited about having another post-doc to talk to and possibly collaborate with. Life in the Jack's lab was a bit uninspiring, not like that lively memory from Jeff Hall's lab, with laughing post-docs, beer hours and lab meetings. It was just everyone keeping to themselves. Jack did try to give mini-classes on fly genetics every so often, but these were odd in the sense that no useful information was imparted, just arcane fly lore about gynandomorphs, attached-X chromosomes, and other information of little value to any of us. He often made it interesting though, with anecdotes about some of the early players in the field. I felt that the arrival of a new post-doc would liven things up, both socially and scientifically. A few weeks before the arrival of Tom, Jack wandered into the fly room, where I was collecting flies at the scope for eventual fainting excitement, and he unprompted said "*I tell ya, Tom's quite the all-American boy.*" I didn't know what he meant by this, but hoped that it was a suggestion of interesting things to come.

When I first saw Tom walk through the door, incidentally our second time at Jack's house, I was immediately disappointed. He just screamed "dud": fuddy-duddy movements, beige floods with sensible white sneakers, a slow-witted look, fat. His wife, Bethany, my hope for Anja, was also a bloated let-down. Talking didn't help: Bethany publicly mocked Tom in that annoying way some women treat their husbands, like he's a child. Tom's brain seemed to operate at half-steam, I felt at the time. He became most talkative about the things he hated: coffee, novels, beer, wine, California, the Rolling Stones, music in general, liberals – a long list. When, within a few days of his arrival he queried me about my religious convictions, my fears were confirmed. He quickly found out that I was not a Catholic or even religious, that Anja was not a Republican, and that if I was American I'd probably vote Democratic. But, I soon found out that Tom was not as slow-witted as I had thought. He was just dogmatic.

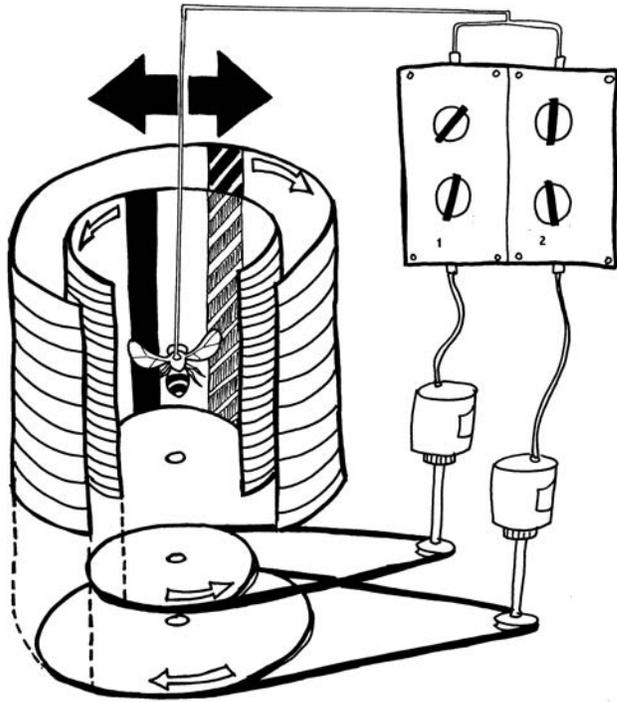
Tom worked on a geotaxis project, extremely boring stuff far removed from cognition: flies moving up or down a choice maze. Still, we were stuck together, and we

went out to lunch every Friday. He took a strong liking to a fish restaurant I introduced him to, ordering fried calamari each time, a diet coke, and a 50-cent refill halfway through; always exactly the same protocol. Warming up to my listening ears, Tom expounded into his worldview, reminding me strongly of Ignatius Reilly, the dogmatic protagonist of "*A confederacy of dunces*". He would offer profundities such as: the current degeneracy of the West was a consequence of evolutionary thinking; he would never travel to Mexico; women weren't good scientists; and the height of civilization was the Middle Ages. I discovered that my immediate colleague at the New Sciences Institute was a devout Catholic who believed that our thoughts came from our immaterial souls, and that Angels had pure intuition. From our conversations, it was clear to me that Tom was more interested in securing a faculty position than in science itself, regularly quoting dull statistics like the citation index of various journals or tenure-track requirements. I felt Tom would have been happier in the Middle Ages, when he might have coasted more easily to a position of authority, perhaps culminating as head of a small monastery – a well-fed happy monk buffered by his routine and his certitudes. I imagined him in a brown cassock, his scalp shaved: he even looked the part! I missed Jeff's people, that lively lab which introduced me to science.

Stuck between Ann and Tom, Jack's lab was no joy for me. I was surprised at first by how little time Jack spent in the lab. He was mostly up in his office, in a different building. It seemed odd because supposedly his recent move to NSI was precisely to unshackle him from office work, to allow him to get back to doing real science. But he wasn't doing any science. I was curious about Jack's flight arena system, the one he had switched on excitedly during my interview, and I asked him to show me how to use it. I was getting a bit desperate after several months of the dull work I was doing, worried that it wasn't going to lead to anything. I was soon disappointed to find out that Jack did not seem to know how to operate the flight arena; but he nevertheless had grand plans for it. He wanted to use it to study fly choice behavior, to have the flying, tethered flies navigate a virtual world of visual choices. In connection to this, he had recruited help from Nick, a post-doc in the NSI theory building, to do some programming which might allow him to do this. I noticed that Jack had some very good people at his disposal at NSI – people who gave their time and expertise expecting nothing in return: engineers, computer

scientists. These busy people dropped everything to help Jack because of Fineman's shadow lurking nearby, their employer and Jack's protector.

One day, Jack came breezing into the lab saying that he had demonstrated fly consciousness. He was joking, of course: he had managed to tether a fly, line up the optical system in the arena, and gotten the fly to fly and fixate briefly on a bar by biofeedback. It looked impressive, and I wanted to get involved with this behavioral approach. Reading up on the subject, I found out a bit to my disappointment that there was a long history – decades worth – of this kind of research, a long list of Germans who had been doing very detailed work of this kind. I did some necessary reading. The arena itself was designed by Michael Dickins, who had worked with these Germans. I asked Jack how exactly to conduct these experiments, how to use the hardware, and he gave me only a few vague, unhelpful comments. Using his pre-wired setup, I sporadically struggled with the device, never seeming to get the flies to fixate well. One day, Michael Dickins was visiting Jack, and he came to see the arena setup. Within a few minutes, armed with an oscilloscope, he had the thing up and running properly. Crucially, he told us that we had to get visualize the wingbeat standing waves for both wings, not just one as Jack had set it up. I was frustrated after Michael's visit, that I had wasted so much time futzing with erroneously set up equipment, and annoyed that I wasn't going to learn anything from Jack in this field; he had just bought the device and didn't know the first thing about how to use it. It amazed me that he was brazen enough to think he could jump into the field and ask sophisticated questions about virtual navigation in flies, without the years of legwork that experts such as Michael had to go through to learn the basics of tethered flight behavior. Still, I now understood a bit how to use the equipment, was happy it was available, and began trying to learn how to program by cannibalizing Nick's Labview software. Some days, I'd spend the entire day trying to debug a program, or have the program accept one change. When I was fed up with Labview, I'd return to counting flies passing out. I'd come home bleary-eyed, frustrated at my lack of progress, but happy to be able to return to my lovely home.



Flight arena concept

One of the unique aspects of working at the institute was the daily lunch, or “fellows symposium” as it was officially called. Here, we the scientific fellows gathered at noon to break bread and chat for an hour. I loved this idea, as I had never been a big proponent of quickly ingesting a private lunch in front of your computer. In St Louis, I had made a daily trek to Anja’s lab, past several hospitals, along half a dozen aerial walkways, and down several halls, to break bread leisurely with my future wife, chewing the fat. At NSI, we chewed on cutlets, sushi, slurped mango sherbet and talked about anything. It was a bit decadent, being served and all, the technicians excluded, but you quickly get used to the taste of raw meat. And, the concept worked for me. When you break bread daily with other people, you end up knowing them and liking them (at least, I do for the most part). When the person is Anja, you marry her. When they’re scientific colleagues, you end up collaborating. Jack attended these lunches religiously, mixing among different groups so as to maximize interactions and conversations. He believed in them too. At these lunches, I got to know Paul and Doug.

Doug was a colleague who worked on rats, recording their brain activity. Paul had recently switched from rats to flies, and was in the process of discovering that flies sleep. He worked for Carlos, a consciousness bigwig at the institute, but squatted in Jack’s lab to do some of his fly work. Paul soon became the heart and soul of Jack’s lab, but not part of it. This exemplified in a way the horizontal, egalitarian nature of the institute, where ideas and people flowed freely. One day, we were at lunch discussing fly sleep and Paul challenged Doug to record from fly brains, to see what they’re brains were doing when they slept. We bandied around some ideas, Jack chimed in that it would be a fun thing to try. As I was by now quite tired of counting fainting flies and the prospect of initiating flight arena research alone seemed naïve, I jumped on the idea. Doug and I would do this together; I had experience tethering flies from my forays into the flight arena, he could record from small brain regions.

The logistics were complicated and clumsy. In the beginning, I would tether a fly and present it to Doug. He’d shove very small wires into its head and thorax, and glue them in. We’d bring it to his shielded rat cage, and half-crawling in would wire it up and look on his computers. We immediately saw brain activity, and, like proud parents, called

Carlos and Jack, the grandparents, to see the dancing waves. They were impressed, their minds already calculating the possibilities. To facilitate things, we moved our operations over to the flight arena room, where I cannibalized the arena's wing-beat detector to monitor fly leg movements. In this way, we could keep track of behavior, and potentially sleep cycles, to correlate with the brain activity. I cannibalized Nick's Labview software to record the brain activity, to save it to the hard drive. This took some bleary-eyed time, to work out the bugs, but I learned in the process. Doug was somewhat reluctant to spend too much of his time doing this flywork at first, and I respected that, although I was eager to do this full-time and figure the system out. What convinced Doug to spend more time, I believe, was when I tethered up a *para* fly (one of my fainters), which paralyzed when heated. I stole the heat source from the flight arena (used, in principle, for classical conditioning), and pointing it at the *para* fly while recording its brain activity, turned it on. The brain activity immediately became "flat as a pancake", in Doug's astonished words. This was powerful, and full of prospects.

Doug ended up spending close to half of his time doing this work, in those early days. We'd say: "You want to do a fly today?", I'd tether, he'd implant, I'd line the fly up with the improvised leg-motion detector, we'd record, and he'd analyze the data with Matlab software. We did a couple overnights, and thought we saw a decrease in activity correlated with no-movement, but no such thing as slow waves in the brain during "sleep." There was a slow wave in the brain, but it turned out to be the fly's heart-rate; haemolymph pumping through at 2-3 Hz. I was very eager to learn how to analyze data with Matlab, and Doug introduced me to some of the basics. I spent a couple more bleary hours trying to write small programs to look at the data, and Doug always was ready to help. Paul, in the midst of getting his work on fly sleep published in *Science*, maintained an active interest in our progress, never making any claims on our work. Jack was supportive, but Carlos did not seem really interested, and I think he advised Doug not to spend so much time doing this fly stuff.

Jack's major interest was in gene networks, not brain activity. He theorized that phenotypes could be achieved by many different ways, a sort of genetic counterpart to Fineman's theories on complexity and degeneracy in the brain. But, Jack's views on the subject were just anecdotal, without any formal mathematics or any genuine model to

test. He just felt, in a way, that biological systems were “messy”, with many small effects (genes) interacting in non-linear ways to produce behavior, or a phenotype. He stated that his network thinking had been too radical at the time, at his previous jobs. He was honest enough to admit that he had no idea how gene networks could be efficiently studied, or how they could be realistically compared to the computational models probing similar questions. In lieu of doing research, he wrote about this unorthodox view in a few reviews, and he worked on a textbook in collaboration with his old colleagues, Jeff and Tim (Tim had been my biostatistics professor at Brandeis, at the time). He showed my clumps of his book. It seemed from me that Tim had gotten the hard parts to write on quantitative genetics, and Jack got the easy chapters on fly behavior. But, the book so far revealed nothing new about how to study complexity and degeneracy in this genetic system; it was just a re-hash of warmed up old stuff. Still, Jack thought about gene networks regularly, on his long car drive over from Coronado Island where he lived. He confessed this to me: that his long commute was when he thought about these things. But, in what way, I wondered? Certainly not any math, I thought. Was he hoping that the secret of gene networks would just suddenly jump out? A “eureka” moment, like with the idea of natural selection? But even Darwin’s natural selection took decades to mature, decades of Darwin counting barnacles and measuring orchids. Jack was never in the lab measuring anything. And, he didn’t do computer modeling either. He just thought and wrote, more of an educator than a scientist. But, without students, he was even more like a theologian, I began to worry: discoursing about the invisible and unknowable.

Jack has an interesting but vague history (he doesn’t talk about it much). Before graduate school with Jeff at Brandeis, he was a politically active leftist. Legend has it that he got onto some FBI watch list, and had to lay low for a year or two, working in a nerf-ball factory in Massachusetts. Jeff’s lab saved him, like me in a way, and sent him on his way to a respected but slightly marginal career as a fly behaviorist. A post-doc at Stanford, a faculty position at Princeton (where he supervised Pam: “He’s tall...”), it seemed easy. Then, a stretch at a private research institute, Roche, and also a divorce at some point I believe. Losing funding, he moved to a position at NYU, and then retreated to NSI in 1997. In his career, he had not published much, but what he did publish was well placed. He sometimes collaborated in some ways with other fly labs and appeared

on their papers, in the middle of a bunch of names. By the time he came to NSI, he had turned his back on the difficulties of academia: getting funding, managing classes and students, pleasing departmental chairs and committees. He was now free to do research, unimpeded by such pedestrian pursuits common to university settings. NSI was a dream come true.

Meanwhile, Jack seemed to live a good life. His house was on the most prime, expensive real estate in San Diego, Coronado Island, a far cry from his low-profile days hiding in a factory. He now drove a BMW, having retired his old Volvo. His pleasant home was well provisioned with clever art, books, interesting pieces. He was renovating. He held catered parties every so often, Christmas parties where Anja and I stood on the lawn with a squirming baby, bracing ourselves for an inevitable crescendo of fussiness while the well-healed of Coronado or NSI sipped and nibbled. It was the house of an intellectual, a man who liked to think and be thought of.



"I thought I saw a cross..." (Roy Lichtenstein, undated)

My first year at NSI, I went to the bi-annual fly neurobiology conference at Cold Spring Harbor, with Jack and Paul. Jack and I stayed at Tim's house, close to the conference center (Tim was a professor there). In the evenings, Tim would lay out his world views in a loud didactic, almost drunken way. His views on science, politics, people. In this vein, he jabbed at Jack, joking that Jack was entering his "dotage" at NSI, his golden years of scientific retirement. I was slightly embarrassed by this jab, as I was beginning to wonder the same. Jack took it quite well, chuckling and sitting rigidly on the couch. It was uncomfortable, because clearly Jack and Tim could engage in a level of dialogue which I had not achieved yet, after a almost a year in Jack's lab. I hoped that one day we could also talk so freely, criticize one another in a friendly, constructive way. Our interactions were still stiff, and quite few and far between. I talked a lot more to Doug and Paul, my immediate colleagues.

One day of the conference, bored out of my mind by talks brimming with jargon on nerve development, I went for a walk in some nearby woods. As inevitably happens when I walk in the woods, I started feeling very relaxed. This was immediately followed by the very pressing need to take a dump. Well versed in this eventuality and it's not unpleasant consequences (see "Love in Benin", chapter X), I found a secluded spot, wondering if this was the first time a visiting scientist defecated in the Cold Spring Harbor Forest. James Watson, co-discoverer of the structure of DNA, resident director, must have at some point; these were his woods. Not being equipped with toilet paper, and surrounded by nettles, I used pages from my conference abstract book which I was carrying (I forget which abstracts), it seemed appropriate in a way. In a way, Jack and I were similar. We felt we were better than all that riff-raff working hard at unraveling narrow biological questions. We were interested in the big questions, and wiped our ass with little abstracts. Jack had often complained about how boring and specialized other peoples' research was, and I had hoped he had something different and fresh to offer.

Stepping out of the woods onto a county road, my first thought was to find my way back to a proper toilet so that I could finish the job. Suddenly a car appeared, turning around the bend. In it were Jack and Tim, on their way, they said, to ride in Tim's motorboat. Would I like to join them? I was happy to join them, albeit uncomfortable.

They must have wondered what I was doing there. We spent the rest of the afternoon playing hooky from the conference, speeding unpleasantly on Tim's boat. Tim enjoyed the power. Jack stood stiffly, grimacing against the salt spray. I yearned for a toilet, feeling unclean. Tim unleashed his views on science, politics, wrongs done to him by colleagues. In retrospect, it would be the only time, for the next eight years, that I'd do anything recreationally with Jack, outside the lab. No hiking in the mountains, no sailing in the bay, no playing with my kids on the beach. Just that one unpleasant afternoon on Tim's boat, braced stiffly against the cold October wind. At the time, I was still hoping he would become a friend and mentor.

Ann, Jack's bitter technician, was "let go", and in her place Jack hired, unbelievably, someone who had also been an undergraduate in Jeff Hall's lab at Brandies, Jenny. I was very happy with this turn of events. Ann had been a constant thorn of unpleasantness, and I attributed this to her inherently foul character at the time. I was wrong about her, partly because I didn't understand Jack and NSI yet at the time. Meanwhile, Jenny was quick, smart, polite, and a fellow Hall lab alumna. Things were looking up in the fly lab. Another post-doc had also started soon after me, Dave. He was to work on gene networks, Jack's pet interest, and so spent all his days looking at relationships between bacterial genes, *in silico*. Drawing from local expertise through the intermediary of Jack, he produced webby graphs of gene names with interconnected lines. Nothing ever came of this, and Dave left within the year. Also joining the lab, but later, was Rozi. Paul and I had met her at that first Cold Spring Harbor meeting. Rozi wanted to do a post-doc on fly sleep with Carlos, working with Paul. So she came to NSI, but Carlos soon left the institute, so she gravitated under Jack's umbrella.

Carlos's departure from NSI was almost cataclysmic – it highlighted for me the instability of the institute. Many senior fellows were suddenly leaving. Fineman scrambled, pre-empting other departures with re-arranged allegiances and sudden promotions. Bjorn, an old student of Fineman's and currently much of the brains behind computational research at NSI, secretly got a job at Indiana University, behind Fineman's back. Carlos, NSI's star after Fineman, decamped to the University of Wisconsin. Eventually, most of the senior fellows would leave, leaving Jack, a relative newcomer, as one of the most senior scientists around. When everyone started leaving, Tom, my

Faithful colleague, got very worried about the sustainability of the institute. He called me all panicky once, late at night at home, inquiring whether a rumor was true: that NSI had finally folded. Someone was pulling his leg. At work, I would see him nervously pumping Betsy, another post-doc, for information and gossip. He was worried about himself and his prospects of course, not about the institute, which he actually disdained.

Carlos's relationship with Jack had also eroded to rock-bottom, just before Carlos left. This was in part due to my ongoing collaboration with Doug. We were finally producing interesting results, Doug and I, and Carlos (Doug's protector) wanted to present some of this data at a conference. He wrote up an abstract. Jack (my protector) caught wind of this, and we were both justifiably hesitant about his presenting the data. It turns out, in retrospect, that we were opposed to it for somewhat different reasons. I just wasn't confident about the data: I had discovered recently that we had been sampling the brain activity at a different frequency than we thought, thereby requiring some reanalysis of some of the data. Jack was very upset and brought me over to Carlos's office, requesting, on behalf of both of us, that he not present the data, that it was premature. Carlos said no, that it was Doug's work. Jack shot back "And Bruno! And Bruno!" Jack was visibly upset, enraged later in his office. Carlos had stolen his fire. I was glad Jack stood up for me, but did not care half as much about this little incident than Jack seemed to. I was surprised how much this affected Jack; there was history here I was unaware of, and it didn't involve just me. Jack was furious, in a quiet, brooding way. Jack would eventually win this round, as Carlos would defect, bringing Jack in closer communion with our leader.

This last altercation did not affect my working relationship with Doug. I started to put in almost all my time on recording from fly brains. I devised a new way to secure glass electrodes in their heads with a micro-manipulator, so that I could do everything on my own (my hands are a bit shakier than Doug's: he would implant wires just with his hands and forceps). I started to accumulate reams of data, and handed it over to Doug who was now doing mainly the analysis on Matlab. Doug also started writing a manuscript. I felt he was totally qualified to write it, and hoped to learn from him how to write an electrophysiology paper, which I was now already seeing as my future science writing career. Things were working really well.



Recording from the fly brain

Publishing a paper is rarely easy; there's a long gap between writing something, with hopes of *Nature*, *Science*, or *PNAS*, and seeing it through in print. Doug sent the manuscript to a few places, with me, Carlos, and Jack as co-authors. I never questioned my position as second-author on that paper, Carlos was third, and I felt Jack's place on the by-line was justified because he was my supervisor (Doug was, in principle, independent: an Associate Fellow). Paul would later berate me strongly about this weakness on my part, saying only Doug and I should have been authors. He was right, in retrospect. NSI was in principle a "horizontal" structure, without hierarchies. Doug and I had done all the work, Jack and Carlos had done nothing. Ideas don't get your name on a paper, everybody has them, as Paul would relate about assholes. But, if Jack was going to be on it, then Carlos was too. This type of argumentation is pretty standard in academia. NSI was supposed to be different; all of us were equal. A bad precedent was set here.

A lot of fighting happened unbeknownst to me at the time. Jack also wanted to be corresponding author (the one who talks to the editor, who one should address after publication), "for continuity", in his words. Doug wouldn't stand for that. Doug got called up by Fineman and yelled at, apparently. But, Doug prevailed in the end. Mind you, nothing had been accepted by any journal yet. This was all a lot of energy and posturing happening before even knowing if the thing was publishable. This is also pretty standard in academia, people haggling over nonexistent *Science* futures. Papers are our currency, and the grants that result from papers.

The paper was not publishable as it was. You can't just record from fly brains, do some correlations with movement, and throw that out in a good journal as a sleep / wake study. Our own colleague, Paul, had just gotten his work on fly sleep published in *Science* by querying key sleep criteria, such as increased arousal thresholds and sleep rebound following deprivation. It became clear to me, following a couple rejections from different journals, that we really had to test such criteria. We needed to find a way to probe whether the flies were actually sleeping, by stimulating them, all the while recording from their brains. This was no easy task, as the flies were tethered in a very sensitive preparation where recordings went out of whack at every sneeze and shuffle in

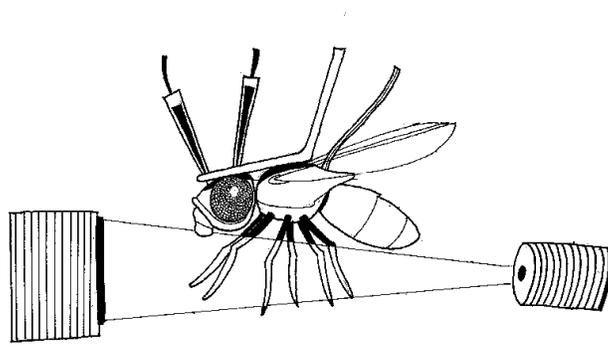
the room. But, understanding this repeated criticism of our reviewers (who had all read Paul's paper, god damn it), we had to think of something to salvage our study.

By this time, over a year into this study, I was doing all of the fly brain work: tethering, implanting, recording. I handed the data over to Doug for analysis, but by this time I was getting pretty good at analyzing data myself. I looked at everything, just to know for myself. Doug was back with his rats, full time, and beginning to sigh at all this fly nonsense which had distracted him for months. But, he wanted this work published too. When we got bad reviews from *Current Biology*, Jack was ready to give up and move on to a lower tier journal, with the same original, somewhat flaccid data. I was surprised at how easily he gave up on this.

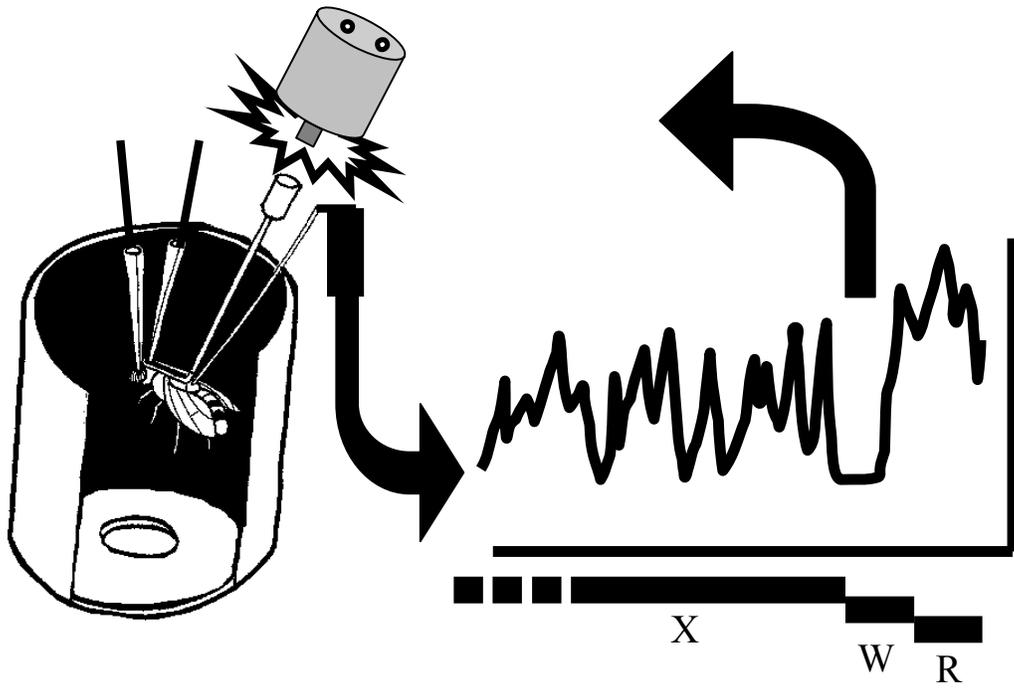
I kept on working at developing the new recording preparation. It's funny in retrospect how much I cobbled together from junk laying around Jack's multiple lab spaces. When I first settled in his lab, I was struck by what a mess it was: carts full of assorted electronic equipment, shelves of disorganized science-ware, drawers packed in any which way with the haphazard paraphernalia of fly work. Much of these dated from a succession of aborted projects: a half-operational olfactory learning apparatus of Tim's design, a heat lamp made by someone to warm the bellies of transgenic mice, crates of plastic-ware and valve-drivers for assorted behavioral studies. Even the differential amplifier I ended up using daily in all of my recording experiments, I found in the trash heap (after Doug pointed it out: "*Hey, that's an amplifier right there...under there...under that junk...*") Jack wasn't the only source of science junk in the institute. Some rooms were veritable junkyards from previous spending sprees, unused scavenging grounds for materials, pieces of wire or plates of glass. I bought almost nothing to set up my recording paradigm. Strangely, it was almost as if Jack had predicted everything I could possibly need. In retrospect, I just made it up as I went along. If I had first found odor-shock choices mazes stashed away in a drawer (as I did eventually), I might have ended up adapting that in some way and studying olfactory learning.

Currently, I had adapted the fly brain recording preparation to the flight arena. With some advice from Michael Dickins ("*You'd better shield that thing like hell from electrical noise*"), I got my first recording of flies looking at moving virtual objects. I immediately found it to be very interesting and started gathering lots of data. I noticed,

for example, brain frequencies which went up and down with time, as if flies were coming in and out of attention for the moving visuals. Since I had already worked out a better way to record fly movement than the original adapted infra-red system (by placing a wire in the fly's thorax), I confirmed that these signals were not a movement artifact, but most likely coming from the central brain. Being better versed by now in Labview programming, and having discovered a clutch of solenoids in a drawer, I started to design a way to test for arousal thresholds in sleeping flies. This involved automatically tapping the flies whenever they stopped moving for a while. In this way, I hoped to address one of the strongest criticisms Doug had faced in the reviews of his paper. The system worked, the data looked good, Doug re-wrote the paper, it was accepted, and I was happy. Doug came out of the experience a bit leery, vowing never to collaborate with Jack again. I couldn't understand at the time why he was so down on Jack. I was optimistic because I'd discovered a whole new arena of research, one that I knew already would lead to even better things, to a whole career possibly. I was recording from flies all the time now, showing them images, puffing odors, refining my sleep analyses; I was having a ball.



Sleeping flies



Everyone remembers what they were doing on the morning of September 11th, 2001. I was admiring the new tile floor my neighbor and I had put in our living room, with my second baby daughter, Tessa, a few months old, listening to “*Purple Rain*.” The neighbors, Luis and Rosa, called us to tell us we were being attacked (while I was in the shower, wondering what they meant: Anja told me). I stayed at home most of the morning, terribly upset. When I went to work eventually I ran into Doug in the parking lot, and he was hopping mad, a normal reaction (“*Drop a nuclear bomb on the fuckers*”). Feeling that recording from fly brains was somewhat inconsequential, I prepared some flies anyway and got beautiful data. The unfolding reams of brain activity relaxed me and took my mind away from New York. It was interesting to register other people’s reactions on that day. At lunch, Andy was joking about putting guns on buildings to shoot kami-kazi planes down. It sickened me. What was the point, I thought, of having a PhD, being an intelligent scientist and father, as he was, if he couldn’t keep anything sacred? Maybe it was his way of coping. Tom, the keeper of the Sacred Faith at NSI, was suddenly extremely upbeat, twitching his leg as he reported the latest updates on *how* the stewardesses had been murdered, with *what kind* of box-cutters. The whole thing upset me more than I cared to admit, partially because of the weird reactions of some of my educated scientist colleagues. Jack seemed sad and resigned about the whole thing, which was a normal reaction, I felt. Myself, I was eventually furious, like Doug, especially at the Palestinians celebrating in the street. Unlike almost everyone at NSI, I supported the American military response, and the subsequent invasion of Iraq as well, one of the few times Tom and I saw eye to eye, but for different reasons.

I felt that Jack was a good human being, and oddly 9/11 put that in perspective for me. Jack was not aggressive, not fanatic about anything. He was careful and measured in his conversations, knowledgeable, had a sense of humor. I was honored to be part of his lab and happy to “collaborate” with him, although I had to date not really done anything scientifically with him. Defending him, I said he was “well read, a good synthesizer”. I looked to the future and felt that some real collaboration would come, where I might glean something from his vast scientific knowledge. We would be a team. At the same time, 9/11 soured me a bit on people like Tom, dogmatic people full of certitudes about

invisible things, like the hijackers. I was baffled why he was at the New Sciences Institute, where we wanted to understand the material brain. I soon found out: Tom, like the hijackers, was on a mission. Proximally, this was to get a faculty position at a respectable university, quickly. More relevantly, Tom was intent on getting Catholic creationist views back into the universities. Instead of joining a Mickey Mouse bible college, where he belonged, he needed to get into a “real” university to have the greatest impact. He wrote a long treatise on the subject, which he actually gave to me to read, including a year-by-year curriculum featuring angel systematics and heavy on Aristotle and Aquinas. I suppose he may have trusted me for a combination of things which usually are associated to his ilk: wife at home, emphasis on kids, political incorrectness, support for the war. He couldn't have been further off the mark about my views, but his openings did promise an interesting interchange to relieve the nonexistent scientific dialogue in the lab. I wondered whether Jack was aware of the gorilla in our midst.

Tom got his paper published, about gene expression of fly strains selected for opposing geotaxis phenotypes. The bulk of the work had been done by others, people at Yale doing the gene expression arrays, and decades of selection by colleagues in Illinois, all orchestrated now by Jack and his useful connections. It got into *Nature Genetics* (41 points, Tom told us), so Tom was well on his way of realizing his plan to infiltrate the system. Because, that's what it was all about: being a respected scientist at a university, and a convinced Catholic to boot, leading to much needed credibility for eventual work or writings on creationism and morality. He confessed as much, often loudly (and stupidly, I thought) on the phone to his Christian comrades at arms. Tom started immediately applying for jobs, already his second post-doc year with Jack. It was working for him; I was amazed that he was succeeding, with Jack's blessing. But it was fair, really. I was somewhat disturbed by some statistical sloppiness on Jack's part in Tom's study. It's all possibly quite meaningless in the larger scale of things, but it was my first suspicion that Jack was not unwilling to cut corners with data in order to convey what he felt was a flashy idea, in this case contriving a connection between two different approaches to fly genetics. Jack and Tom never published anything else together, at least for then next decade, not even a review.

The story of Tom is worth pursuing at this point, as it contrasts significantly in some ways with my eventual denouement at NSI. Tom applied most of his energies after his publication to get a faculty job, for three successive years. He ended up applying to 200 openings, and got 18 interviews. The second year of his job search, his first serious foray, he got interviews at Caltech and the University of Chicago, among other prestigious places. Now, the University of Chicago is where some of the best minds of evolutionary biology reside. Tom, who does not think humans evolved at all (although Africans may have devolved), Tom who believes in classifying angels, Tom who believes in a supernatural God thoughtfully guiding his creation, Tom almost got a job in the premier evolution department in the country. Apparently, his letters of recommendation were excellent, including a glowing one from Jack (this was confirmed to him by host faculty at various locations). But Tom interviewed terribly, and wasn't getting any offers.

Around this time, we had been joined by another colleague, Herman, a lively fellow Belgian initiating fly aggression studies in Jack's lab. I recall one day Herman and I were riding back from a rare Friday lunch with Jack, and baffled by Tom's Chicago interview, we delicately asked Jack what he thought about Tom's religious convictions and views on evolution. Jack, always careful and non-confrontational, stated that, like most Catholics, Tom kept his convictions at home, separate from his science. This was so far off the mark, for us who worked next to Tom, that we were stunned into silence. Either Jack was lying, was a poor judge of character, was ignorant, or really befuddled and confused. Or, perhaps he genuinely was open-minded, sending a religious fanatic to Chicago because that was fair, after all. Why should we atheists play the same good-old boy game that the zealots have played so long? Give Tom a chance. Perhaps Jack was just a good man, equal to all. I hoped so.

Tom was quite active on the religion front. Apart from personal endeavors, such as attending mass every single day, perusing his well-thumbed bible in his car after lunch, and meditating at his desk in general, Tom was an active religious writer and attended several creationist events across the nation. Fairly soon after his arrival at NSI, he had shared his masterwork with me, "The Beatific Vision," a scholarly educational program heavy on Thomas Aquinas, his hero. Tom was at first quite secretive about his religious views, at work. Between close colleagues, he'd argue loudly (often viciously) about "first

causes” and morality. Sometimes, these debates continued in the lunch room, where he’d lower his voice a bit. As the lunch room would empty toward one o’clock, he’d lower his voice even more, casting furtive glances in the direction of Jack and the Directors, sitting at a nearby table. He was clearly worried about his views in this place; he was a Christian soldier in the enemy’s camp. He had a mission, to get a job at a university.

But, when Tom published his first and only scientific paper at NSI, he became more confident. He started openly attending religious conferences and some “intelligent design” gatherings. In these meetings, he’d be listed as “from The New Sciences Institute” (Google is a wonderful resource in this regard, it’s all out there for everyone to see). His affiliation with a seemingly prestigious science institute was probably valuable; it provided a degree of legitimacy to some kooky gatherings. Still, he was going to these shindigs on his own account, not as a “neuroscientist”, which was how he was described on the conference websites. I, for one, wouldn’t have identified myself as being from NSI if I went to a comics convention, for example. I’d be Bruno, from San Diego. It was transparent, what he was doing, at least to me. The culmination of this farce came one summer when he went to a national Catholic Convention in Chicago, again as Tom from NSI, to deliver a scholarly lecture titled “What’s wrong with biology and biologists: the remote roots of the moral crisis.” I read his lecture (available online), and, in a nutshell, he was saying that the lack of morality today was because of biologists (like me, Herman, Jack, and Fineman) preaching materialism. Itching for a debate about this, I wrote a lengthy rebuttal to Tom, which I gave him to read. It’s wordy, but fleshes out my growing desire to draw Tom into an all-out debate at the time (it’s attached at the end of this story – Supplementary data 1). Although peripheral to this story, my letter to Tom marks my growing confrontation with the religious mindset. It’s funny, in retrospect, how you don’t have to be religious to have that mindset. I was learning a lot from Tom.

Tom said he’d answer my letter with one of his own, but never did. He may have started seeing me as dangerous after this, and our sporadic debates were never the same; he became more guarded. When I sent my rebuttal letter to the organizer of the Catholic Convention in Chicago, as an alternative view from NSI, he was upset – quite understandably. He didn’t want a public debate about this; he needed to get a job first. But now I was interested. I had never thought too much about religion *and* science

before, or about my freedom to do science in a religious society, which the US sometimes seemed to be. It was worth fighting for the secular way, and I became more passionate about this, especially since I had kids now who would be going to public school. Interested in what we might be coming to in the US, I visited a creationist science museum in an exurb of San Diego once. It was frightening. I brought my kids eventually as well when they were a bit older, and they loved it, which taught me something. An account of my first trip there is added to this story, at the end, after my letter to Tom.

Meanwhile, I wasn't learning anything from Jack, my supposed mentor. I was surprised how little we interacted even after a few years together. He was never in the lab and I never saw him doing an experiment. What he did all day was a mystery to me, since he had no teaching or grant-writing responsibilities. I'd go up to his office in the other building every couple weeks (always on my own initiative) and tell him about my work, about the papers I planned to write on my work. Every time, I would have to get him up to speed at first and remind him what I was doing. He'd be supportive and say "*That's really exciting, I think it's fabulous*" and such sweet nothings, but he never really gave me the kind of advice I expected from the famous author of a fly genetics manual. As for Jack's inroads into studying network complexity, this seemed confined to the growing web of colleagues and journal editors he was cultivating. I was on my own.

Down in the lab, we were becoming a good group with several post-docs and technicians. But the post-docs all were on their own, and the technicians mostly worked for Jack on mysterious side-projects which were not discussed. Some of Jack's techs, such as Sunni the tired Ethiopian mother-of-two, worked very hard, scoring hours of videotapes of flies courting. Others worked less hard. Jack would delegate tasks by phone or email, from his office. Nothing ever seemed to result from all of these technicians' work (about nine people in all, in overlapping succession). Their contribution to my work was minimal: I got fly food. In end, after ten years, not a single publication would have resulted from Jack's "private" lab; all came from post-docs working mostly on their own. This doesn't mean the techs weren't any good; they were just abandoned or mismanaged, skipped from one unfinished project to another. As a lab, we got together sporadically for lab meetings. But, these were so haphazard and often cancelled because people just didn't feel like presenting their data, and Jack didn't encourage lab meetings. I got quite

frustrated at the time at our lack of cohesiveness as a lab, each of us doing our own thing in our own little rooms. What was the point of being a lab, of being alive even? I remember this being one of my first criticisms to Jack. We were having lunch, a rare lunch together outside of NSI, it must have been a Friday. As I ate a gyro and he had a chicken salad, I wondered if he'd get offended. I chided him for not holding people accountable in his lab. I said that people had to publicly present their research every so often, so that they could be criticized and be given advice. The best way of doing this was by having regular lab meetings, on a schedule. Jack agreed. I was relieved to have this criticism go over so well. We'd have weekly lab meetings from then on, which I eventually organized and which Jack now attended. This was often the only time we saw him, except for lunch. But, at lunch he now sat increasingly next to Fineman, at his proverbial right side, where we weren't invited. Jack was always accessible in his office, but then I sometimes wondered why we really needed to see him. I never seemed to learn anything from him; it was always us telling him things and getting him up to speed, trying to keep him in the loop. He seemed to forget things which had been previously discussed, needing constant reminding. It actually crossed my mind that he was perhaps going senile, or had a terminal disease (he was so ashen-looking). I sort of felt sorry for him, because I actually liked him and wanted him to be part of my scientific life, and healthy.

I was preparing my next paper, where I'd present my latest results on electrophysiology of visual responses in flies. Writing it was fairly easy, but when we submitted it to *Nature Neuroscience* (me and Jack as only authors), the reviews were harsh, as usual. As with the previous sleep paper with Doug, it became immediately clear to me that an additional set of laborious experiments needed to be done. With the sleep paper, the strongest criticism had been about calling these epochs sleep, which called for a new paradigm to test arousal thresholds by tapping flies while recording from their brains. With the visual work, we were claiming that a 20-30 Hz oscillation in the brain was associated with visual "saliency" or attention. The strongest criticism from a reviewer was that we didn't show any associated behavior, just brain activity. You get this sinking feeling when you just know that you're going to have to bite the bullet and do the work, that it's the only way. So I did it, and weeks later successfully added that

part to the paper. I wrote all the replies to the reviewers myself (Jack corresponded with the editor), through three rounds of review, with a final showdown against one reviewer who didn't seem to understand (this always happens). I learned a lot from this process. Jack and I also interacted more than usual at this stage, and I still see us sitting in his office, by his computer, massaging the text to try to make it say what we wanted it to say. This was his contribution, really: smoothing out the language. He was good at fixing sentences, and we iterated well off of each other to produce a decent manuscript.

Sitting by Jack in his office, I was struck by something he said as we ironed out the final version. He said "*This is it. This is going to be it.*" And he repeated this. What was going to be it, I wondered? The final version of the manuscript? No: I looked at him closely, thinking "Hello, the man's aiming to be famous." I wondered whether he cared more about the splash (fly consciousness!?) than the about the science, or about my continuing this line of experiments to actually understand something. But, I was also proud of my work, knew where it was heading, and was actually honored to have Jack with me as a co-author. The fact that he named himself as corresponding author didn't bother me in the least. He was my post-doc advisor.

The paper, "*Salience modulates 20-30 Hz Drosophila brain activity*", was not a runaway newsmaker like fly sleep (easier to understand), but it did jump-start Jack's lecture circuit career. Unlike the sleep work, which had been Paul's work under Carlos, or Doug's work in the last paper, this was entirely "his". Soon after the paper's publication, Jack was often away giving talks with titles such as "The rudiments of consciousness in *Drosophila*", or "From sleep to attention in *Drosophila*", or, after maybe getting some flak for assuming too much, "The sublime to the ridiculous: from somnolence to awareness in *Drosophila*". I never was at any of these lectures, but my view was that he weaved some story from sleep behavior to sleep electrophysiology to visual attention in flies, with asides and preambles on human consciousness in general. He must have given dozens of such lectures, from Australia to Europe to many universities in the US. Jack was increasingly away, spreading his gospel. Paul fumed whenever he discovered that Jack lectured about fly sleep, and he asked Jack to stop doing that: it was Paul's work. I thought Paul was being silly. Let Jack talk. Who cares?



“The rudiments of consciousness”

IN BRIEF

Fruit Flies Have Rudiments of Thought

Fruit flies have the rudiments of consciousness, according to a study published online in the journal *Nature Neuroscience*. Bruno van Swinderen and Ralph Greenspan of the Neurosciences Institute in San Diego presented flies with various images. The flies responded with a characteristic burst of brain activity.

Researchers Draw DNA From Animal Dung

Researchers from Columbia University have devised a technique to procure pure DNA from the dung of animals, which eliminates the need to capture, sedate and draw blood from wild, endangered or aggressive animals.

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Around this time, we started getting more traffic in the lab from visitors, both from the media and potential donors being courted by the institute. Jack would walk in, often impromptu, with a couple eager old ladies in tow. He'd go to the flight arena room, switch on the flight arena (glowing nice and green), and give them verbatim the same story about visual biofeedback he gave me a couple years ago when I interviewed. Then, he'd also mention sleep, and the fact that flies and humans shared so many genes (*That's amazing! These little flies!*). He didn't really talk about fly attention; it was too tricky, especially if Fineman was in tow (Fineman had doubts about fly attention). Sometimes, if a guest was particularly important or rich, Fineman would be leading, with Jack as second-lieutenant. Invariably, Fineman would be very rushed in this part of the tour, quickly moving people along after I had delivered a few enthusiastic remarks. I felt a bit like window-dressing, as if flies shouldn't be overplayed, they weren't that serious. I played my role well, the brash young scientist, a bit of a rebel. Perfect institute material, a prime example, more than the flies, of what NSI was. I understood my role. The irony is that I actually am a bit of a rebel, which is not at all what NSI wanted in reality.

Also around this time, Jack and I had a rare dinner together where he urged me to consider staying at NSI beyond my post-doc, for a career as an independent researcher. It was clear that he was very keen on this, and that the NSI bosses were happy to have me be part of the team as well. I was fully expecting this (otherwise, I would have started moving on by now), and I remember being happy about this turn of events, but I also remember saying something stupid. I told Jack that was great, but that I was a "loose cannon". I don't know why I said that. It's just what loose cannons like me sometimes do, I guess. I don't even really know what a "loose cannon" is, except that I felt like one sometimes.

I transitioned to "Associate Fellow", but this was just a title and nothing really changed: I worked in Jack's lab (More crucially, got a raise. Still, I was cheap for them: paid less than local academia and without startup funds). There were about half-a-dozen of us Associate Fellows (including Paul and Doug), all uncertain about what our title really meant. In principle, we had a lab, could hire personnel, and publish our own papers. Soon after my promotion, I was surprised by a comment from Jack, told to me in

the privacy of my recording room. He entered the room, closed the door, swallowed hard, and stated that “he certainly hoped nothing bad would ever happen to our relationship, but in case it did, he wanted me to know that I could claim independence from him: my research was all mine.” I thanked him for this, but was taken aback: why should our relationship go bad? And, I wasn’t planning on stopping to publish with him, now that I was “independent”, I had a few more papers in the works from my time with him as a post-doc, and I was still hoping we’d collaborate. This sudden assertion came from left field, and I wondered what was going on behind the scenes. I knew his relationship with Paul had soured badly. Fineman must have been cautioning him about something, I thought: “*Careful Jack, don’t scare Bruno away now.*” It was sometimes a weird place, this NSI where I was hanging my hat: pretenses of equality but actually very rigidly hierarchical. It didn’t bother me. I’d adapt.

I was more concerned with the Catholic Church and its grip on power. My emotions crystallized more naturally around Tom, that lone outpost of the Catholic empire. I wrote Tom a second letter around this time, but I never had the courage to let him read this one. It would have been too offensive to him, for one single paragraph, and I wasn’t ready to dissolve our interesting relationship. I didn’t want the Tom book to end, just like when I read about Ignatius in “*A confederacy of dunces*”. Tom was too interesting to me, and I actually liked Tom as a colleague-at-arms in our pathetic lab. We both had children now, daughters. Tom was a classic misogynist, and I hoped his daughter would grow to be a strong, intelligent woman. Armed with daughters and seeing them grow, I felt strongly about the role of women in history. In my letter, I waxed lyrical. In retrospect, it was a classic case of psychological transfer: I was also questioning Jack and NSI, in a subconscious way, more than Tom or his religion. That’s pretty clear for me now when I re-read that agitated, strange piece of work. It’s attached at the end, too, supplemental data after the creation museum visit.

But, I was also itching for a confrontation with Tom, now that I knew his worldview and career goals (to get religion back into schools). I felt I disagreed with pretty much everything he held sacred, and I carefully baited him every so often, on any old topic. We’d be sitting at our microscopes sorting flies, with the following sample dialogue ensuing:

Tom: Jenny had her music on yesterday. I can't stand modern music; it's dissonant.

Me: What kind of music do you like?

Tom: Gregorian chants.

Me: You don't like the Rolling Stones?

Tom: The Rolling Stones? I'd spit on them if I saw them. What kind of message does "I can't get no satisfaction" send to society?

Me: It's actually a very deep message (I was prepared). It's all about women's liberation. The full verse is "I can't get no satisfaction, I can't get no girl reaction." It's about the novel desire to give her satisfaction, unlike days of old, when it was all about men.

Tom: I think female orgasm is over-rated...I never...(unfinished sentence).

My interactions with Tom were priceless; I was lucky to have him, and his existence in my life provided a lot of interesting anecdotes I'd relate to Anja after work, after our kids were fed, washed, read to, and put to bed. I treasured Tom.



"I can't get no girl reaction."

I also got to know our Director, Fineman, a bit better now that I was an “Associate Fellow.” Every so often he’d pick me out to eat at his lunch table (he always sat at the same spot). Some Senior Fellows, such as Jack, had standing invitations to sit with him. The rest of us were honored with an invitation, often on a whim, every few weeks. He’d be friendly and erudite, going through what seemed to be a well-rehearsed monologue. But, he was also interested in what we junior people had to say, and I believe that he found me to be likeable at the time. He never really believed in what my work (fly attention) had to contribute to understanding the human brain, but he was willing to converse and let me argue about this. I also began attending human brain imaging meetings once a week with him and a number of colleagues who did MEG research on attention and consciousness. These were useful meetings in the beginning because I was applying similar methodologies to analyzing fly brain activity. Fineman would preside, asking each person in turn whether they had any new data. He’d joke, he’d speculate, he’d criticize, he’d suggest experiments. He’d worry that we weren’t getting anywhere. In contrast to Jack’s nonexistence in our fly lab, this was striking to me.

Jack was busy writing reviews, which is what often seems to happen after you publish an important paper. He favored “cute” titles with political or literary overtones, such as “No critter left behind: an invertebrate renaissance” or “Systems neurobiology without backbones”. In these reviews, he mainly concluded that insect brains were much more sophisticated than we had previously thought. Jack was also eager to get his gene networks angle going, his original *raison-d’etre* for being at NSI before he got distracted by Paul’s sleep work and my brain recordings. Unfortunately, I had put my original gene networks project on the back burner while I was developing the brain recording paradigm. Most of the gene work was done, and I had uncovered some pretty interesting results. The gist of these results were that network interactions (defined by statistical non-additivity) changed depending on the core alleles of the syntaxin gene. There was a ton of data, and a substantial amount of statistical analyses still needed to be done. Jack wasn’t equipped to do these analyses, so he had to wait for me to get it going again. Meanwhile, enthusiastic about the implications of this work, he already wrote a review even before the paper was written, titled “*The Flexible genome.*” In it, he alluded to my data, making

figures of the same logistic-fit curves I was using, concluding, in a nutshell, that “Genomes are much more flexible than we had previously thought.” This seemed to be his mantra, that he was undoing previous dogma. But you need data to say stuff like that, otherwise it’s too easy. I had results which sort of fit this view, I just needed to write it up. When Jack wrote this pre-review on what was to be in large part my future publication, jumping the gun by already including stripped-down versions of my figures, he never asked me to comment on the manuscript or be an author on the review. He was presenting his grand plan on how to look at genetics in a new way.

After his flexible review was published, in a way predicting our future publication, Jack was very eager to actually get the data written up and published. He prepared a mock-up of the paper, which was a title page and abstract formatted for the journal *Science*, an empty results section, followed by a few blurbs of discussion stating, once again, that genomes were more flexible than had previously been thought. I remember being a bit surprised at the transparency of his intentions. After a grand, revolutionary-sounding title, and formatted for a big journal, he had already asterisked himself as corresponding author, even before the paper was written. I was amused that he felt it necessary to do this at this early point in the process. Putting a paper together is a long, laborious job, as he surely knew all too well. For him to claim the paper for himself so early on, when I knew that it all rested on my shoulders, was my first suspicion that the man, Jack, had issues about recognition. Was this paper also going to be “it” for him?

Jack’s scientific history is interesting in this regard. Although well-known, he was never really successful as a scientist during his years in academia. He published little, but got his name on a few important papers in fly behavior genetics (he’s since doubled his publication volume, the last ten years at NSI). He only had one grad student (Pam, of Wash U lore), never could get funding, and was actually “relieved” from all of his previous positions, either because he never got tenure or because the institutions he worked at were dissolved. I recall him telling me, early on in my post-doc at NSI, that he was “ahead of the times” in his scientific ideas about genetics, that he’d been saying genomes were flexible already years ago. His viewpoints were never backed up by much of his own data, since most of his publications were run-of-the mill fly behavior genetics, involving courtship or foraging paradigms. Now safely at NSI, Jack seemed to want to

“get back” at academia in some way, and the best way of doing this was of course by being very successful outside of academia. He needed success, in a way, to redeem his failures at his university jobs. Paul, Doug, and I were beginning to provide him with material on a gold platter, which he couldn’t wait to broadcast to the nation. I began to understand this foible of his, around the writing of the Syntaxin paper. Sleep and brain responses in flies were temporary filler until Jack could stun the world with his revolutionary ideas about the flexible genome – a new-age Darwin. It’s forgivable – many scientists have pretty big heads, me too sometimes I guess. Still, Jack never gave any lectures about Tom’s geotaxis work, his first publication by NSI; it was always my stuff. I was flattered, at first.

For someone interested in gene networks, Jack is awful at statistics. I discovered this soon into our writing of the Syntaxin paper. He had no real knowledge of what tests to do, of how to define epistasis (gene interactions) at a statistical level. I had to work out all of this out on my own, basing much on my grad-school background in quantitative genetics. I’m not complaining. I needed to know the field. Still, it’s frightening when your supervisor doesn’t know anything, because then it all rests squarely on your shoulders. For example, to analyze some of my matrices, I had to derive a modified version of an equation. I did this empirically rather than purely mathematically, because I’m no mathematician. But, I could have used anything there and Jack would have been none the wiser; Jack was too busy crafting the discussion. To do this, he had to become acquainted with a lot of my grad-school material, standard quantitative genetics stuff, such as epistasis. He didn’t seem to really know what epistasis was before he worked on that discussion, I felt. He confessed that he learned a lot writing it.

Around this time of writing, I did something odd which illustrates my evolving take on Jack. There was a bunch of data to analyze for epistasis, and this involved laborious curve-fitting and subsequent statistical tests. I was eager to make Jack feel more involved in the actual analysis of the data, perhaps to encourage him to participate more scientifically in my work. So, I set aside a block of data for him to analyze, which he eagerly did. But, I made sure to analyze the same block of data just to be certain he was analyzing it right, so it actually wasn’t any less work for me (more work, in fact, because I had to give him a tutorial). It was as if our roles were reversed, as if I was the mentor. I

just didn't trust his statistics; he made too many mistakes and was sloppy, often blinded by what he wanted to get. I felt the need to make him feel like he had contributed significantly to the data analysis, which was silly in retrospect. It never led to any real collaborations of any sort, because he never had any analytical skills to offer. Instead, I would find myself reminding him, for example: "no, Jack, you can't do t-tests on variables without any variance. Those stats are meaningless", or "we can't have so many significant effects, you really need to correct for multiple comparisons before saying that's significant."

Not only did Jack lack analytical skills, he also made things up. Sometimes this was harmless, such as doctoring figures to make them "look better." Using Powerpoint, his figures were layered mish-mashes of concealed graphs or lines he didn't want to show in his talks. Instead of going back to the source data and replotting stuff (maybe he didn't know how), he'd use old graphs and past white boxes on parts of them, stretch them out, squash them. It was ugly. Worse, when he needed a picture of a fly brain labeled with some gene expression for a blurb or other he wrote, he might cut, flip, and paste two identical hemispheres together to make the pattern look more symmetrical. This was borderline fraud, but maybe still OK because he was conveying an "idea", not actual data. Once, while I was working on my subsequent brain-recording paper shortly after the visual work, I had sent him a figure of correlation data. These represented sequential correlation values (as histograms) for a sample fly (brain activity vs movement) throughout the night. When I got the figure back from him, the correlation histograms were all decorated with error bars. How he placed these on there, I don't know, but I did know that the data did not, could not, have error bars because they represented single data points. Did he feel that they looked better – more legitimate – with error bars? How did he invent them, each a bit different than the other or all the same size? Did he actually paste them in with Powerpoint? It was embarrassing for me when, later (I had been on vacation at the time in Wisconsin) in his office I had to say "*Umm, Jack, I don't think there were any error bars on this graph...no, they're just single data points, yeah...I don't know how they got there*" and he replied "*oh, yes, OK.*"

Our second paper together, featuring the correlation figure (*sans* error bars) came out six months after the first, in *Current Biology*, the same journal that had published

Doug's paper on sleep electrophysiology in flies. Jack was now establishing a close rapport with the editor of that journal, already writing a few short general pieces ("No Critter left behind") and serving as a reviewer for a number of manuscripts submitted from other labs. Jack never shared these reviewed manuscripts with me, and he never asked me to review one with him or for him. Jack was also busy gathering a stable of famous neuroscientists to submit articles for a book he was editing together with *Current Biology's* editor. It was a savvy move on his part: everyone jumps to collaborate with journal editors: they open doors. Thus, Jack was building a big book and establishing many connections, mediating between colleagues and the editor. He never shared any of this with me, even though a lot of it was very relevant to my current vision research. I worked in my tiny room, happy.

My son Jesse was born in February 2004. A week after he came home, Jesse became very jaundiced and had to be hospitalized. During this time, Anja and I would spend long hours in his hospital room while he lay in a UV box and the doctors repeatedly poked him to draw blood, to try to find out what was wrong. It was awful, and we were exhausted. I can only imagine what it must be like to have a chronically sick child; I'd go nuts, or become religious. During this time, NSI was having its annual Neuroscience Research Program (NRP) conference, when they'd invite (at great expense) select famous neuroscientists to give talks for a couple days. This was always treated as a prestigious affair, but I often felt as if the invitees were wondering "*What am I doing here?*" and that the thing was pulled through with growing uncertainty every passing year, riding largely on an aging Fineman and his Nobel History. To keep the thing going, the NRP board selected new members each year, who were invited for next year's talks. If the setting had been Indiana, they couldn't have carried it off, like NSI itself in a way. People like to come to San Diego, they go to the zoo and the oceanfront, and Michael Dickins, of flight arena fame, came that year to give a talk. Unfortunately, I missed it as I was in a hospital room downtown. I got to attend some talks, though.

Jack also gave a talk that year, as he had a previous year. Both times, he talked about my work. I remember Cory Bargmann, a reknowned *C. elegans* researcher, sitting by chance next to me exclaiming "*This is really interesting*", and that made me happy. But, Jesse took a turn for the worse that day, so I left and we were back in the hospital,

worried sick, sitting on vinyl chairs in a small room. Jesse got a blood transfusion, his little heart pumping really fast as he tried to get enough oxygen to his brain, his heart rate gradually slowing with some unknown benefactor's blood getting the upper hand. After another sleepless night in my clothes on a hospital bed (and Jesse back under the UV, like some terrible experiment), Anja brought us coffee in the morning and we watched over him together as his counts slowly crept back to normal. For some reason, I went to NSI that evening, as if it was important to catch some snippet of valuable neuroscience knowledge during our personal turmoil. It was the last night of the NRP, and they were having their cocktail gathering. I walked in and found Jack talking to Michael Dickins, both sipping wine. Michael was asking Jack something specific about his talk: "*So Jack, when you record from the fly brain...*" and Jack was answering in awkward generalities. As I stood there next to them, I sensed that Jack was somewhat uncomfortable about my intrusion. Was I imagining it? Did I cramp his style? They both ignored me, as they continued to talk about fly recordings, so I moved on and had a cracker; then I went home. Jesse recovered in the next few days (we never knew what really happened), and I remember Fineman seeing me one day and saying "*Bruno, you look tired.*" It strikes me now that Jack never displayed any awareness that I had a new baby, or that I might have been going through a hard time. He never even offered a "congratulations".

I don't think Anja or I had a full night's sleep in all of the first eight years of my time at NSI. There was always a young baby around screaming at some point. There were always middle-of-the night diapers to be changed, Anja coming and going multiple times for nursings, me blearily asking "*did he finally poop?*" or "*she spit up again?*", all that great stuff. Tessa had terrible allergies her first two years and would scratch herself till she bled, and sleep miserably, as would we. Lena was colicky like a screaming banshee. Jesse would call "Mama" throughout the night. They were all light sleepers and they wore us down. I don't regret a bit of it, of course. I'm sure most parents have to go through this at some point. But, sometimes I wondered about Jack and his home life. I pictured him reading extensively from his well-stocked library in his quaint Coronado home, getting time to think and write about science, evenings of intellectual pursuit. His office at work was similarly crammed with books, a whole wall of them: he was building a collection of important works in biology, some first editions. Meanwhile, I never got

much reading done; instead, I was reading Sesame Street Alphabet books, over and over, to my girls. After the kids got put to bed, Anja and I might unwind with “*Survivor*” on TV. I barely had time or energy to read other people’s papers, or worry about what research others were doing. In a way, I hoped that Jack might fill me in from his extensive readings, suggest books and articles, like a real mentor. He never did. Lab meetings, which sputtered on sporadically, were just a pretense of our having a real lab, and they soon died out and we were all on our own again.

While I was learning how to be a father, Jack appeared to be evolving into a salesman. The only time we saw him in the labs now was when he’d be touring a gaggle of trustees or potential benefactors. He’d carry on the same old dog-and-pony show, flicking on the flight arena switch and delivering platitudes spiced with false enthusiasm. It struck me that he’d behave this way even when I was in the room working. I would have felt absolutely silly in his place, repeating the same well-worn spiel, the same jokes, in front of someone (me) who’d already heard it a few times, playing the part of a the wacky scientist. He knew that I knew he hadn’t done any actual science in years, and if he did, this charade didn’t seem to bother him. Did he actually believe he was a working neuroscientist? Was he delusional? Or, was he just doing what needed to be done, a salesman for NSI. In any case, between acts he looked increasingly ashen and expressionless. I didn’t envy his position, but still felt that he could have done research if he wanted to. That’s what NSI was all about: no teaching, no committees, no grant writing; just science. In my cartoonist mind, I began to picture Jack as a snake-oil salesman of the Old West, as I had imagined Tom as a cassocked monk. Jack would be wearing a dusty top-hat and a frayed suit with a checkered vest, lugging his suitcase of colored phials, traveling from town to town, claiming cures for any ailment by some colored liquid combination, nervously worried about being booted out of town on a rail, tarred-and-feathered. It’s not an enviable job, a salesman. I could never do it.



“The birth of a salesman.”

I was enthusiastic about my science and life at NSI and felt that I might stay there for an entire career. Sure, some things were not ideal: Jack was proving to be a dud, I was virtually alone in my work, and salary wasn't great compared to local academia. But I thoroughly enjoyed my work, and I was never really interested in making money anyway. Also, all things said and done, I'm a pretty loyal guy, and I felt grateful for the chance NSI had given me these first years. I cringed whenever my colleagues slammed NSI and Fineman, belittling his achievements and suggesting how the joint would collapse in a few years. I often defended the place, saying it was up to us to make it work, not only Fineman. Tom was one of the worst offenders in this regard, constantly reminding us of NSI's imminent demise, poking fun at Fineman's age and comb-over, gossiping about another scientist's rumored departure. He really annoyed me, partially because I was staying while he was looking for jobs elsewhere. I had a stake here.

Having displayed some signs of promise and loyalty, I began to be invited into Fineman's close circle of confidence. This included a brain imaging group that met weekly, as well as sporadic requests to join him at his table for lunch. I'd even get called up to his office every now and then, to sit on a creaky, slippery leather chair while he chatted congenially on the couch. I played the role of the brash, adventurous young scientist, which I was. Fineman encouraged me to get away from fly research and start working on pain perception, using EEGs. It was, he felt, an unexploited inroad into consciousness studies. Like hypnotism, or visual illusions.

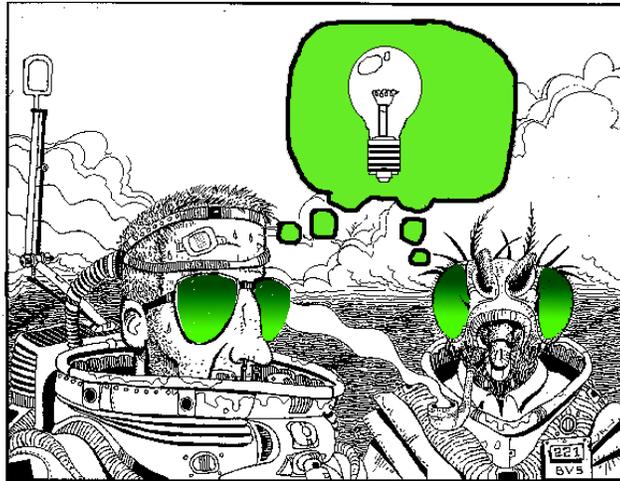
Getting to know the general, I began to be struck, perhaps inevitably, by his weaknesses and foibles. I had always known, as did everyone, that Fineman had a major ego (you need one, to some extent, to make a New Sciences Institute). But now I began to suspect that his current research program was a bit shaky. It sounds presumptuous, but I expected *more*. Here was a world authority on consciousness, having written several books *explaining* consciousness, with good scientists and valuable scientific instruments at his command, and reduced to wondering what we should try next week, hypnotism perhaps? There was no real program aimed at investigating the theories, metaphors really, he had popularized such as "re-entry" in the brain. Instead, I now witnessed the brain group spending two years working on trying to make a better lie detector for the CIA,

which didn't really work and produced only one publication. Part of the problem was that all the members of the group had their own research interests, at which some were quite successful, and they just humored the old man and his consciousness once a week, and then tried to be left alone for the rest of the week. It was sad, to me.

I wanted to do more than just humor the old man because I was actually very interested in studying consciousness and learning how to do human brain recordings in the process. I saw myself as having a lab split between humans and flies, two ends of a related spectrum. I think I could have swung it too, if I had been given the support. It would have been challenging, but feasible with some help. So, I inherited an old EEG machine (it actually cost NSI an arm and a leg, when they had purchased it a couple years ago for another scientist who left, Ramesh). I didn't know a thing about operating it, or doing EEGs, but I set out to learn and wasted a lot of time, much as I did when I started fly recordings. In addition to the EEG, I inherited a device designed to deliver tagged painful stimuli to your finger, the perception of which would be recorded in the brain. Others had already done this of course (I realized this repeatedly, most things had already been done), but the frequency tagging effect was special here. I decided to recruit the help of the ex-NSI scientist who had bought the EEG, Ramesh, now a faculty at UC Irvine. It was the only way of really learning, from someone who knew. So, I tried some miserable, wet EEG experiences on my own (in the process delivering by mistake a maximal jolt of pain to a friend who volunteered to help me here), and then carted the whole apparatus to UC Irvine to try for a real experiment there with Ramesh. We did an experiment (on him, with me delivering pain, carefully this time) and analyzed the data. It looked promising, and I learned a bit more about how to conduct these types of experiments and how to analyze the data. Enthusiastically, I showed the data to Fineman, and he was very encouraged too. However, when he found out that I left a copy of the data with Ramesh, he turned sour and condescending, calling Ramesh a slimy Pakistani (he's actually, like, totally Californian, of Indian descent) and calling me naïve for leaving my – no *Fineman's* – data with Ramesh at UC Irvine. I was amused by this: here was a world-famous scientist concerned about one day's data on one subject, as if that would lead to a paper on it's own, as if the answer to the mystery of consciousness was right there in the red glow of Ramesh's one brain scan experiencing pain on his index

finger. What was he worried about, that Ramesh would scoop us now? Didn't he understand that I needed collaborators who knew their science, like Ramesh, or be condemned to years of doodling like an amateur? Instead, Fineman strongly discouraged me from collaborating and berated me for my ignorance of the ways in the world. It was his paranoia which actually amazed me, and how removed he had become from the world of real data. Also, like a Pakistani from the autonomous tribal territories, he distrusted everybody.

But, I still liked Fineman. Like Jeff Hall, he was full of references, funny and extremely serious at the same time. I began to see him as a potential mentor, more than Jack ever could have been. There was much I could learn from Fineman, I felt. His idiosyncrasies were partially symptoms of his old age, I told myself, which did not diminish the value of his ideas and knowledge. He'd gained the right to say whatever he wants.



"Humans and flies."

Jack, now a mini-Fineman, revved up to an even more active lecture circuit, invited to numerous conferences and colleges to talk about fly sleep and consciousness, attention, arousal, gene networks. He was all over the map in the US, as well as in Australia, Italy, Spain, Sweden, Switzerland, China, often combining his lecture stints with vacation travel. The titles of his seminars still betrayed his penchant for creating a splash, and his demeanor was chatty and casual. Some of his talks were filmed and available on the web. He always gave a very general talk, without any real data, slipped easily into cute wordplays, and was usually quite effective at this craft of delivering an entertaining talk. Having become respected, he wanted to be liked as well. A lot of the slides I noticed were from my work, including my cartoons, and I couldn't help noticing how he straddled the fine-line of giving me my due ("*Bruno recorded from a fly...*") while implying that the ideas were all his, like he was actually "running" a lab, with me as a talented disciple of sorts. But, he shamelessly stole fly sleep away from Paul, discoursing as if Paul had also been under his tutelage, which we all knew was patently misleading. This made Jack look bad in our eyes, those of us who really knew him. He also looked bad when he made things up in talks, conclusions without any basis, because they "fit" his general storyline. For example, Jack learned about "coherence" one day. I remember the exact day when, sitting in his office, I explained to him what coherence was, and how it was different than "synchrony" (I was just learning these concepts myself, and how to measure them mathematically). I think he liked the concept, just like "degeneracy" or "selection". When I found that coherence (phase-locking between brain signals in different parts of the brain) increased during fly visual responses, he was thrilled. So, now everything was coherent for him: arousal was a spectrum of coherence, with very little of it during sleep, more during wake, lots during attention, and tons when you're on drugs. There was maybe some indication of this trend, but huge gaps as well with absolutely no data. This didn't matter to Jack, who showed slides of coherence plots, invented graphs really, across the arousal spectrum. He even referred, now slurring his speech a bit, to nonexistent results. He was always careful, though, to keep things general and "theoretical" enough so he could get away with this slop. The image of the snake-oil salesman was hard to ignore.

Worse than being just a salesman (who knows his lot), I began to wonder if Jack was delusional, like an Islamic scientist. What I mean by this is that he already seemed to “know” what he wanted the result to be before finding ways of “proving” it. For example, Islamic scientists might know that there are 380 bones in the body, because the Koran says so, and then set out doing “science” proving that there are in fact 380 bones, by fusing two metacarpals here or dividing a scapula there, until the numbers match and Allah’s will is done. With Jack, it’s more subtle, but just as nonsensical. He looked for “degeneracy” in oddball genetic results that didn’t seem to fit anywhere, and for “coherence” as a way to string together disparate behavioral results. These concepts are of course also studied mathematically, which Jack didn’t have access to, hence his metaphors and snake oil. I don’t know which is better or worse: a delusional person or a bluffer. One of them is genuine, but dangerous; the other is a liar, but at least knows the score.

The larger picture that emerged for me here was my growing realization that Jack needed to get prominent a way. Just as Darwin “thought” of natural selection, Jack would think up a new synthesis for biology, preferably relating genetics and neuroscience in one grand insight. But he had no insight, just metaphors and half-baked ideas borrowed from other scientists doing real work, scientists collecting and analyzing real data, designing real models. What I began to understand was that Jack had a major chip on his shoulder about his rightful due as a scientist (my own chip, incidentally, was growing). He’d spent years in academia never really getting respect, without grants or many students, not getting tenure, and then “retreated” to NSI. Now, he was beginning to achieve a certain notoriety as a refreshing maverick publishing novel stuff, and now, like Eddie Murphy at the Grand Ol’ Opry, he wanted to return saying “*See: I didn’t need y’all; I was better than y’all, ya’ll kicked me out and now y’all are inviting me back, left, and right to talk about my work.*” It made sense to me now, how he had said to me before “*I was before my time, people just didn’t understand me back then...*” or “*This is it...this is going to be it...*” or “*They’re all just doing boring, specialized research...*” Now that Jack was being served his cake, he wanted to start eating it, all of it. So, he went on a world tour of lectures, networking himself to the prominence he felt he always deserved. In a way, Jack

was the only NSI employee paid a senior salary only to promote himself, full-time. Years of this had paid off, Jack was well known and in demand.

Understand that this is mostly in retrospect. I still appreciated Jack around this time and did not begrudge his need to promote himself, as he was in part also largely promoting my work. I just didn't realize at the time how it really all was about himself only. Looking back, I should have been surprised by the lack of feedback coming my way as the result of my publications: Jack kept everything for himself. He never forwarded papers from other scientists for me to review, which would have been valuable experience for me. Of all the talks he was invited to deliver (dozens?) as a consequence of my work, I was only "given" one, a symposium on oscillations in Utah. He took the rest. This is quite unusual for a mentor.

Recall that Jack's main interest was not sleep, consciousness, or attention – the subject matter of his recent rise on the lecture circuit. His original focus at NSI was supposed to be "gene networks". The only semblance of research into gene networks being done at NSI was the syntaxin suppression screen and diallel cross I had initiated during my first year there (the fainting flies). Jack often encouraged me to finish that project, and, as we know, designed elegant title pages as encouragement. I bit the bullet and finally finished it, four years after I started it. But, I knew what the greatest criticism of the project would be: repeatability, especially after such a hiatus. So I clenched my teeth and stared at fainting flies for hours to get a handle on that problem. I analyzed the data, wrote the paper, and Jack wrote parts of the intro and discussion. It was, in a way, the most we had ever collaborated on a project, because he put some time into understanding and explaining concepts such as epistasis; it was what he was really interested in, after all. The paper took some iterations to get published in *Genetics*, but after it was, Jack could genuinely claim to be studying gene networks, so he began to go on that lecture circuit as well, and portray himself a bit of an expert in evolutionary genetics to boot.

In the process of drumming out the syntaxin paper, Herman (my Belgian colleague working on fly aggression) and I had some ideas about how to further investigate gene networks in a similar context, largely as a result of debates we had in the lab with Paul, who hated the whole "gene networks" concept. We devised a scheme

where we might ask “can any fly behavioral phenotype be changed by trans-heterozygous combinations of any random mutations”? Jack loved this idea. The analogy with the snake-oil salesman’s suitcase of colored liquids curing any ailment in some combination was not lost me; it was totally up Jack’s alley. But there was a reason for trying this; it came straight from my syntaxin work which had uncovered considerable phenotypic variability with a few re-arranged combinations. Almost everybody in the fly lab became involved in this project some way, as we would probe a number of different behaviors. Tom respectfully declined to participate, seeing little immediate advantage in this collaboration leading to any effect in getting a faculty position somewhere. The rest of us were enthusiastic. The project brought everybody together in a way, finally. We all put in considerable time on this work at times (except for Jack, who delegated), and I began organizing lab meetings centered around moving this project along. We called it “The Matrix”. It had the potential of making a big splash: “*We can affect any phenotype with only a few mutations; there’s nothing special about the genes y’all work on.*” Jack loved it. I was happy we were doing something together at last, at least those of us in the lab.

I was struck anew, in the middle of doing the matrix, at Jack’s complete lack of understanding the statistics behind studying these genetic interactions. We were, after all, co-authors on the syntaxin paper which used exactly the same methods, and I was amazed to find that he hadn’t even bothered to understand the stats. He had just concerned himself with, literally, the intro and discussion of “ideas.” I recall having to re-explain (for the fifth time?), step-by-step, how I calculated non-additivity, for example. But, it ended up being just an excel template wherein Jack could cut-and-paste numbers to get some final values. I don’t think he ever really understood it. In any case, Jack was now fully engaged in his field of choice, gene networks. This did not keep him from continuing to lecture on fly brains and consciousness, his bread and butter until the Matrix would pay off.

We were all still frustrated by Jack’s lack of involvement in the lab. He could be out traveling for weeks at a time and it would have had no impact on us. Rather than reflecting a smoothly-running lab, this was a testament to his irrelevance to our work. When my colleague Rozi complained of Jack’s disinterest in her work, I promised that as soon as she started putting a paper together, Jack would come through for her. This

wasn't cynicism on my part, I truly felt that paper-writing was the only opportunity when he could really relate to us, and I told Rozi that Jack would get interested in her work then. When Rozi was finally ready to write a paper, which included data of my own, I ended up spending more time than Jack on it. Jack was still surprisingly detached and sloppy, I found. He'd spend his greatest efforts trying to wrap ideas up in catchy yet ambiguous finales in the discussion, and then miss serious errors throughout the text and results. In this paper, Rozi was claiming a story about dopamine and arousal in the fly through an oblique methamphetamine angle. Knowing that a serious criticism of this claim was a paucity of data actually looking at dopaminergic fly mutants, I braced myself to do such experiments in my brain-recording setup. For all the work I put into Rozi's paper, its eventual publication (again in *Current Biology*) was a big weight off my back. Jack again was corresponding author. I was now independent and looking forward to publishing on my own, to be corresponding for a change. "Collaborations" always seemed to leave me short-changed. But, this is a common complaint.



“My collaborators.”

I had been sort of oblivious of the nature of my situation at NSI because I was very happy with my life at home and at work. It's as simple as that. The real nature of my situation was not unlike the Mob: I was the hard-working Sicilian grocer, giving a cut of my earnings – protection money – to the local consigliere, Jack, who communed with the Don. My status in this hierarchy was made crystal clear to me one day in early 2005, well into my supposed independence. One morning I got a phone call from Jack, on a weekend I believe, asking for my social security number. I gave it to him, and then asked him why he needed it. He said it was for a grant he was finalizing, which needed to be submitted really soon. The conversation went something like this:

Bruno: *A grant on what?*

Jack: *It's on the salience stuff, brain recordings and novelty, coupled to some of the robot work...for the National Science Foundation.*

Bruno: *Can I read it, Jack?*

Jack: *Er...sure...I'll send it to you.*

I read it, or what Jack decided to send to me: a cut-and-paste job missing some of the grant specifics (who's in charge, how much money, how long, etc), mainly text abruptly ending at some censored point. It was indeed centered on my fly-recording work. I was upset. Why hadn't Jack let me in on this, I could have really helped to make this an excellent grant; I had a bunch of relevant, promising data, and I was eager to work together with some of our computational fellows. Since I was supposed to be independent now, independent from Jack, and since I was the only one doing this kind of research at NSI, it had to involve me somehow. It was my bread-and-butter. Why hadn't Jack told me?

The next day, Jack called me from what seemed to be very far away, a scratchy cell-phone call from a car in LA or something:

Jack: *Did you read the grant?*

Bruno: *Yes, I did. But, Jack, why didn't you tell me about this. I've got quite a lot of suggestions here, and now there's no time...*

Jack: *Yes. I'm sorry. We had originally planned on your being a consultant for the project, but now I changed things to make you a co-PI on the grant.*

Bruno: *Thanks, but really, you should have told me. Was it Fineman who told you not to include me?*

Jack: *No...No...No...Nk...(swallowing?), we just needed to get this done, and you're co-PI now.*

A consultant? I was going to do all of the work single-handed, and I got to be only a consultant, and only became a co-PI once I find out about the grant, almost by accident? I began to think things over, and realized it wasn't the first time that Jack had kept me out of grants. When I finished the syntaxin work, Jack had put together another NSF grant, on gene networks, which he got funded (about half a million dollars, with himself as PI). I knew this (he referred to this grant in our paper's acknowledgements – a falsehood, because the grant was bequeathed after I had already done all the work and submitted the paper for the first time - I understood now Jack's urgency in wanting me to finish that syntaxin project.), I knew this but it really hadn't affected me at the time, and I chose to ignore his lack of communication in this regard (Anyway, I wasn't really working on syntaxin anymore). Now I saw a pattern: Jack did not want to involve me in grant writing for projects clearly related to my work, where I would be doing the work.

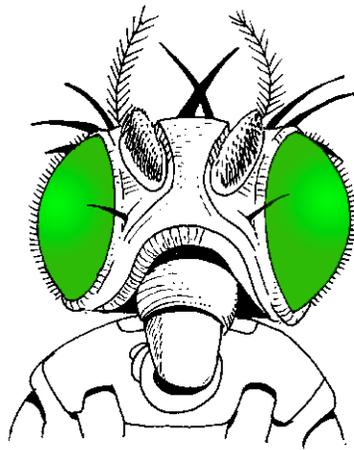
Grants are important, almost more so than publications. They signify to potential employers that you're able, as an independent investigator, to attract funding and support

yourself. Now, scientists at NSI were not supposed to have to write grants, but clearly this rule had been broken and a trusted few were given this privilege. Understand that grants can give you freedom to move to another institution. By preventing us from writing grants, NSI wasn't really relieving us of anything; rather, they made sure we were less able to leave of our own accord. This became instantly clear to me in early 2005, something Tom, in his slow witted-ness had been complaining about for a while: universities were not interested in hiring post-docs without grant experience. By keeping me out of the loop, NSI made sure I was less able to ever jump ship. It's all about control, really, just like the Mob.

I was still willing, at this time, to seek a discussion on this little problem, and hoped that by expressing an interest in being involved I would from now on to be included in grants. I wasn't planning on leaving anyway, so why not include me? So, I wrote a polite email to Gunnar, the research director, stating my views on this matter. The following day, I got called into Gunnar's office, and I ran up eager to iron out this misunderstanding once and for all. After all, it was a mistake. As soon as I entered the office, I felt something was off. Both Fineman and Gunnar were in there, and they looked like they were readying themselves for an execution, Mafia-style. I sat down, Gunnar shuffled papers a bit and moved the phone closer to the coffee table where we sat (a recording device?), Fineman looked revved up, nodding to Gunnar that he was about to begin. Gunnar nodded back. What transpired over the next hour or so was an insulting, degrading slap on the wrist, designed to knock me down a peg or two. Fineman acted very upset (it was an act, in true Brando form, he wanted to scare me), and Gunnar, more professional, admonished me from sending a "discoverable" by email. Discoverable to whom, I wondered? I protested and tried to explain my point of view, which led to a diatribe of expletives and insults from Fineman, attempting to belittle me back into place, using classic Mob imagery. I had heard about such behavior on his part, but had never experienced it yet personally. What struck me was his misjudgment of my intentions. I was loyal, intended to work with them on this, and never planned on de-camping from NSI, yet he used the same one-size-fits-all, degrading tactic on me as he would have on a real target worthy of such an attack. It betrayed a profound lack of adaptability, and even imagination. He made no difference between me, who believed in NSI, with others who

truly hated him and planned on running away at first opportunity. When the abuse was finally over (Gunnar looking slightly embarrassed), I already was considering leaving this place. Not so much because of the insults, but because of the emptiness I worried lay behind it. I wanted to be sure I could still be employed in five years, and I lost faith that day in Fineman's ability to keep the ship afloat.

Fineman was clearly worried the next day that he had gone too far. He called me into his office first thing in the morning and asked if everything was alright, also between me and Jack. I half expected him to reach over and pat my cheek, like Don Corleone. Still reeling, I said everything was fine (a young Al Pacino, learning), although I was still trying to piece things together at this time. I was now beginning to get a bit resentful about Jack's "stealing" my work, and finally saw a connection with his previously having tried to do the same with Paul and Doug's work. Then, Fineman tried to put a lid on my complaint about the grant, to have me concede the error of my ways, but I refused to budge in my view that they should have told me about it. This made him furious, and we started all over again in an insulting, degrading round. I didn't budge. He fumed. It was all so pointless, that I started becoming purposefully nonsensical (remember, I'm a loose cannon), saying things like "*Well, I'm a Berber*" or "*Look, I don't have to do this, I can just go home and draw comics.*" This scared him, I think, because I looked totally unpredictable. We would meet in this ridiculous way a couple more times, neither side satisfied at having won the battle, and eventually mollified to some kind of truce. As I left his office that final time, he said "*And, hey, no journals, OK?*" Right.



"I'm a Berber."

Life at NSI was still enjoyable, but I did start to actively think about alternatives now. I thought not so much about leaving, as about what I needed to do to ensure I'd be happy here. Tom, in contrast, was in full departure mode, but depressed as hell about his prospects. He'd had about 17 interviews over the past two years, and not a single one had panned out. Some had been very promising, until he'd come back from the interview. Tom suspected that word was getting out about his religious views, and this made him very nervous. Whereas we used to have discussions about religion, Tom increasingly clammed up about his views now. Previously, I had almost coddled him, a rare creationist treasure adrift in a world of non-religious scientists. I was worried that if I attacked him too strongly, he might clam up, and I'd lose an entertaining source of debate. It sounds somewhat shoddy on my part, but it's true. For example, I once carefully asked him how he felt about human evolution. He said that he believed humans evolved from apes. Surprised, I asked him how he felt that happened: slowly over a long time, or quickly? He confessed that he felt it happened in one generation. One generation? You mean, an ape mother gave birth to a human child?, I asked. Yes, he mumbled (realizing the problem), it was infused with humanity (i.e., a soul, by God). I would have loved to pursue this debate (did the human child mate with ape cohorts?), but stopped right there because I feared it would lead to ridicule which might alienate him. During that era, Tom was interviewing, based on Jack's stellar letters of recommendation, at prestigious departments around the country, including Evolution at the University of Chicago, and Biology at Caltech. But, Tom's actual interviews never seemed to work out. They must have smelled something fishy about him, and he began to get mad about the unfairness of it all I think.

For those of us who knew him, the most frustrating thing about Tom's views was not the content itself (God, angels, first cause, and the like), but his dishonest approach to argumentation. For him, it was all about rhetoric, not about understanding. He'd state his dogma, loudly establish some points, make you admit that you agreed with some of them, then guide you towards contradicting yourself or admitting ignorance in well-worked out stratagems, thereby concluding that his initial premise was correct. It was often entertaining, and we rarely succumbed to probing the realm closest to his heart, his greatest vulnerability: belief in God and the supernatural. As scientists, we reflexively put

all of our cards on the table when trying to understand or debate a problem. Tom kept his cards, his true beliefs, close to his chest and trusted we wouldn't touch those because they were sacred to him. Mostly, we politely obliged and were left frustrated after arguing with him. Once, I did not respect his sacred cards. I plucked the coddled rare flower, and destroyed any possibility of future dialogue for at least a year. The argument, over lunch, concerned the question "what is life?" For Tom, life could be reduced to "willful movement." Things that moved on their own were alive, things that couldn't move willfully were not. The catch here was "willful", sacred code for the breath of God. We argued for a while about movement. Was movement of ions across an ion channel in a membrane preparation willful movement, I asked? No, that wasn't, it had to be self-motivated, he said. We went along this vein for a while, regressing inevitably to the creation of the first organism and how it suddenly changed from being non-living to living. This reminded me of his view that humans occurred in one generation, an ape mother giving birth to a human, the sacred untouchable subtext being the infusion of the soul. As I debated various positions on how organic matter could have created the first living organisms, throwing my heart and soul out on the table while Tom attempted to guide me to logical dead ends or contradictions, it struck me as ridiculous that I was skirting politely around his supernatural view, that God breathed life into the first organism, and that all subsequent life contained this vital force which could not be touched by science. It was a ridiculously unbalanced argument (me open to all angles, him protected against a huge hole). I'm sure the same frustration is faced by countless secularists like me, and for the first time I lost my composure and flatly stated what I knew he believed, that it was all about God, and asked why he didn't just state that instead of constructing all of these rhetorical shenanigans and logical conundrums. He clammed up immediately. Sophomorically, I got up from the table, saying something like "*I can't take this bullshit.*" It was ugly, and I ruined it for us. But, the confrontation was symptomatic of my general feelings at the time: I was beginning to reject more than just Tom's bullshit. It was the beginning of the end for me at NSI, because Tom wasn't the only one holding his cards close to his chest. Jack's quiet game was annoying me more.

Jack at one point potentially had the chance to really make NSI a great center for *Drosophila* behavioral research. We had Paul who discovered fly sleep. We had Rozi

working on drug effects on behavior and sleep (who originally came to do a post-doc with Carlos, who left soon after she arrived). We had Herman doing groundbreaking work on fly aggression. I did visual behavior and brain recordings, something no one else was doing. Finally, Indrani, who came to do a post-doc with Paul, was working on social behavior and sleep in flies. All of us would leave eventually, for essentially the same reasons. One of the main reasons for the disintegration of our group was lack of leadership from Jack, and Jack's not supporting us if it disadvantaged him in view of his boss, Fineman. In the end, we all faced the same problem, again one not unlike a mafia-type situation. Fineman listened only to Jack for fly-related issues, so we were all dependent for our survival on this go-between who never did any of the work, never generated any real ideas, who never really wrote any of our papers, and who didn't really know what was going on in the labs while he was sitting in his office. In reality, like a true money-laundering front, Jack ran an independent lab via his succession of technicians, whom he delegated by phone and email, who altogether never produced anything publishable. Meanwhile, Paul would go on to produce a *Nature* and a *Science* paper, then feel compelled to leave. Herman and Tom each had *Nature Genetics* papers, I got a slue of papers, and even Indrani produced a *Science* paper. To a certain extent, we fly people put NSI on the map, it could be argued even more so than any of the theoretical robot-type work being done there. A leader would have capitalized on these successes to strengthen the fly department at NSI, attracting complementing talent (e.g., a cell biologist, which we lacked, or giving us control of a budget), making us want to stay because it was better here than elsewhere. Instead, Jack was only looking out for himself, even to the detriment of the people who fed him papers. The success of our fly research at NSI was a spontaneous spark mostly initiated by Paul, which was allowed to fizzle, because if it had grown it might have snuffed Jack's crucial position between us and Fineman.

Doug early on had vowed never to interact with Jack (scientifically) again. I had been puzzled by this at the time, and argued vehemently against Doug, defending Jack ("*He's just weak!*"). Paul was the next to give up on Jack, fed up of having him take credit for the work on fly sleep. I argued against Paul about this too, defending Jack once again. The future became dim for Paul at NSI, as Jack would always be there to claim his

work, or stymie it if he felt inclined. Seeing no way of getting around this problem, Paul left for a job in academia (incidentally, to my grad school, Wash. U). It really was Paul, not Jack, who started us all on our path to probing higher-order behaviors in the fly. Jack had always been more interested in the idea of gene networks, and just went along for the ride on sleep and attention. When Paul left, Jack fully inherited Paul's post-docs Rozi and Indrani. Indrani was the next to leave, falling out of favor with Jack quickly. One day, we had a lab meeting where Jack and Indrani had a disagreement about something (she's a hot blooded Bengali, Jack's a snake in the grass). Jack was mad at her, and left the room in a huff. The very next morning, I got called up to Fineman's office (he was still speaking to me at the time). He asked "what happened yesterday between Jack and Indrani?" I explained as best I could the nature of the disagreement. Fineman fished a bit more, trying to get me to rag on Indrani. As I left Fineman's office, considering some facts, it struck me that there were only two ways Fineman could know about the altercation. Either the labs were bugged (always a distinct possibility at NSI), or Jack went up to Fineman soon after the altercation to whine about Indrani. This last possibility was even more unpleasant than the off-chance we might be bugged, because it suggested a level of pillow-talk between Jack and Fineman beyond my expectations. Indrani was eventually fired, for supposedly other reasons, but it had all been downhill since that day. She's not in science anymore today.

I had experienced the nefarious effects of pillow talk already in grad school, in the lab of Dr Derg where I had started doing PhD work. Derg was a tall grizzly, weak, and inconsistent lab head (not unlike Jack) who had an affair with one of his post-docs, a bony Lithuanian, who he eventually impregnated then married. She stayed on as a long-term post-doc in his lab. The special relationship between Derg in the office and the Lithuanian among us had a terrible effect on morale in the lab. We knew that she was reporting everything to him, the good the bad and the ugly, and that she would always have privileges we wouldn't. It's an old problem, dating to the dawn of human societies probably, but I saw it now again at NSI. Jack and Fineman were for all intents and purposes sleeping together. It annoyed me that Jack would immediately go and complain to Fineman; it's just not something a leader does. It's what a weakling does. I lost a lot of

faith in Jack that day, walking down from Fineman's office. He'd rag on me in a heartbeat if we had a disagreement. I had to get out of here.

I scheduled a meeting with Jack, where I voiced my concerns about my future at NSI. I told him that I would send out a couple tentative applications for faculty positions at universities that fall. I told him I missed university settings, with graduate students, undergrads, and a lot of movement, teaching, and all. I was concerned for my financial future at NSI, for security for my family. This was all true. I didn't add the biggest reason, of course, which was that I felt his role at NSI made it hard for us underlings to succeed here. He could essentially block post-docs from working with me (he did, twice), if he so much as gave Fineman a thumbs-down. He kept me out of grant writing, and never supported me in the debacle that followed my questioning this position, just saying "*Oh well, Fineman's an odd fish sometimes.*" So I kept the protagonist out of the picture when I voiced my concerns to Jack, partially because I would now be requiring of him letters of recommendation. He agreed to write letters, saying in the process that I was the best he'd ever had in his entire career, and that he still thought NSI was perfect for someone like me. I thanked him, encouraged that he'd now write me a great letter. Letters of recommendation are not like grad-school evaluations; if you agree to write one, it's with the understanding that it will help you. If you feel uneasy about promoting somebody, you can decline to write a letter. I was elated that my relationship with Jack was intact, and that he'd help me find a job. We chatted some more (a rare event, really) and he confessed that he got unofficial job offers at about a third of the places where he gave talks, where he talked now largely about my work. This too was very encouraging. Talking congenially now about my overt concerns at NSI, he dropped his quote for the year:

Take care of your science, and your science will take care of you.

I looked at him. Was he joking? No, he was serious. I nodded. Yes, I believe that Jack. That's pretty much been my shtick for these past six years. But, finding a job will not necessarily be easy: look at Tom, still unsuccessful. And, look at local history: most people had left NSI secretly, not telling Fineman. I didn't want to go that way, secretly.

I'd tell Fineman right away. Jack agreed that this was important. He wrapped our chit-chat up with another memorable quote, his own now, oddly disjoint from what he had just stated about job offers:

In a way, it's much harder for someone more senior like me to get a position somewhere else.

Yes, I understand that Jack. I was surprised at his candor. Was he looking for a job? As Jack left my office, he said one last thing, his expression blank:

And...um...don't tell anybody I just said that...

After telling Fineman that I'd be "looking around," things turned a bit more chilly for me at NSI. Fineman still acknowledged me, but I could tell he was seeing this as a major betrayal. Since most people who had left had done so behind his back, catching him by surprise when the deal was already sealed at another place, he was now faced with the unusual situation of being given advanced notice of someone's possible defection, by no less than that person himself. I still attended the imaging meetings with the brain group every Wednesday afternoon, and these became uncomfortable. Fineman would pretend I didn't exist, never looking at me in the eye, skipping over my physical presence when asking for opinions, ignoring my sporadic statements. Since I was now well beyond the stage of being awed by the honor of attending these meetings, I saw them more clearly for what they were. It's interesting how a little bit of cynicism can suddenly make you see things that were invisible before. Here were a collection of very smart people, some of them experts in their respective fields, humoring the old man on his lie-detecting machine for the CIA. There were plenty of very interesting studies that could have been done over the years with an MEG machine at your disposal every week. Instead, it was "OK, let's try to get more subjects to up the N, and see if we get significance." Or, "Let's have some people fall asleep in the machine and see what happens." Or, "Should we try hypnosis?" It seemed to me that Fineman was out of ideas, and was hoping for an insightful, definitive experiment which would suddenly reveal the mechanism of

consciousness, blooming in colors across the brain plots. It reminded me a bit of Jack, hoping that an understanding of gene networks would somehow jump out at him without his actually doing any real work. In the brain imaging meetings, we'd often be confronted with a table-full of brain plots, actually spilling onto the floor, each individual annoyingly different from every other one. Fineman would then marvel that the brain was so "degenerate", just as he'd theorized so many years ago in his books. This also reminded me of Jack, who would see degeneracy in any conflicting data, marveling at how "messiness" was inherent in all biological systems. Jack would criticize the specialized work of reductionists by claiming degeneracy, invoking some invisible, immeasurable principle. It wasn't too far removed from Tom's theology, hoping to see a signature of God in flies' geotactic antics. Back at the awkward brain meetings, no matter how hard one stared at the colorful images of brain activity, it wasn't obvious how to study consciousness in a useful way. Worse, many had already done such work; bookshelves in university libraries are sagging under the weight of thick journals with EEG studies of consciousness, attention, sleep, perception (I was dumbstruck by the sheer volume, at the UCSD library once), and none of us seemed to care to review those studies, as if previous work didn't matter until we had decided to tackle the issue. As weeks and months passed, and Fineman once complained, fingertips on his closed eyes, "*I don't have much time...*", I understood that the meeting were only a ritual to humor the old man, and that most people just wanted to be left alone to do their other work. Eventually, Fineman announced that the imaging group was dissolved. The following week, he re-assembled the group, minus yours truly, and I was relieved.

Jack was banking on our "Matrix" project, the one Herman and I dreamed up, to propel him into prominence in the messy world of gene networks. He still gave numerous talks across the country about consciousness, sleep, and attention, but seemed more excited about the impact he would make revealing just how messy gene networks really were. It was almost as if this would serve his final retort to all the simple-minded, linear gene biologists who denied him proper respect all these years in academia. At appropriate scientific venues (e.g., please talk about whatever you like, Jack), he gave tentative lectures on gene networks to feel out the territory. This would typically involve

a portrait of old-fashioned Isaac Newton, very angular looking, followed by the aged Darwin with his messy beard. Then, a Jackson Pollack-like splatter representing how things were really messy in genetics, compared to the traditional view of a clockwork orange. To substantiate this succession of metaphors, he'd talk about my Syntaxin suppression screen diallel cross results, which was now published. Sometimes he would venture into invoking the gurus of population genetics, such as Fisher, Wright, or Haldane, and how his work was going to reconcile the three takes on evolution. This was risky on his part, because I doubt he knows the math behind Fisher and Wright. I don't anymore, and I went to grad school in that field.

I found out by chance at some point that Jack was going to deliver a prestigious Gordon conference plenary lecture on gene networks, most likely my syntaxin work and the first matrix results (most likely because there was no other approach to gene networks under his tutelage at NSI). This was an important venue, not your run-of-the mill seminar series invite at a university, his usual bread and butter. I wondered whether Jack was ever going to tell me about this upcoming event, whether we might get together and discuss what we believed in the data, what was worth presenting, and put together a coherent picture. But, no, whenever I liberally discussed my analyses of the matrix results, he'd ask "*can I have that figure?*" or "*can you email me that data?*" without revealing an upcoming presentation of the stuff, which I actually felt was premature. This reminded me of his reaction to Carlos presenting our fly brain data so many years ago, when we asked Carlos not to present it because it was premature and half-baked. This was the exact same situation with the matrix data, and Jack was pulling his own Carlos now that the tables were turned. I confronted Jack about this, a day or two before the application deadline for conference, saying that I wanted to attend as well, to be involved in any ensuing discussion, at least. Jack turned sour: "*Well, apply, Bruno.*" I did. We eventually gathered to talk Matrix, and Jack was in a bad mood, while I was on edge. The meeting seemed to be about credit. Feeling confrontational, I suggested that Sunni, Jack's shy Ethiopian technician (who had recently been fired after seven years of mismanagement and abandon) should be included in any presentation of our Matrix results (she had done a lot, quietly). Jack said "*it's not gonna happen,*" (NSI unofficially discouraged including techs on papers or even abstracts, Jack knew). I sought help from Rozi and Herman to

back me up, putting them in an awkward spot. The fight was on. Jack tried another tactic, to cause a divide between Herman and me by saying “*The Matrix was just as much Herman’s idea*”, or between Jenny and me with “*Do you agree that Jenny has put a tremendous amount of work on this?*” I wasn’t arguing any of that (I was arguing for Sunni, now conveniently fired), but realized immediately that things could potentially get very nasty with Jack, and that he wouldn’t hesitate to play dirty.

Eventually, Jack delivered that plenary lecture at the Gordon conference. He actually did a pretty good job, and it was probably the most thought-provoking talk at the conference. He first showed his Newton / Darwin, mechanical / messy metaphors, then he talked mostly about my Syntaxin work, then ended with the first statistical analyses of the matrix project, along with a rationale for the project. He showed a slide for the movie “The Matrix,” starring Keanu Reeves (we expected this), and people chuckled. Then, the meat: he’d apparently worked quite hard at doing some stats in addition to the ones I’d given him, on the train and in his hotel room. The resulting histograms, which he showed, were peppered with way too many asterisks of significant effects, a dead give-away that something was wrong. Indeed, when I looked at his excel sheets later on, he’d misplaced a few columns and everything was in fact miscalculated. But, it didn’t matter, it was a good general talk which conveyed the idea of what we were trying to do. I couldn’t help noticing the confidence he displayed at the conference, chatty and doggedly argumentative at the same time, laying out his claim on how biology was really messy. He charmed the audience with his unconventional thinking and his simplicity at the same time. Herman and me, watching, were of course fully aware that simplicity was all there was, so far. In the car, I for the first time voiced the following thought “*The man’s become a bit of a fraud.*” Herman laughed, uncomfortably (he had just presented his aggression work and was beginning to see The Matrix as a joke). It was the first time that I said this to anyone else than my wife. In a way, it’s hard to go back once you start thinking someone’s a fraud. You have to dissociate yourself, or it eats you up.

Before going to this debutante ball for Jack, I had tried to put all of my cards on the table with him, to try to draw him into some real dialogue with me. This was prompted by a succession of events, in addition to the previous strain. The NSF grant had just gotten funded, three-years worth and again half-a-million dollars. Our grant

supervisor from NSF was supposed to swing by our institute to talk to us and look at the set-up. I was surprised to be excluded from interacting with her, demoted to just “showing her my stuff” for a couple minutes, technician-like, while Jack and even a few others who had nothing whatsoever to do with this grant were asked to wine and dine the NSF lady. This exclusion was hard to take. Then, just prior to the lady’s arrival, something strange happened. Jack was suddenly in the hospital, apparently in some distress. When I saw him, he looked seriously beat-up, with green bruises in different parts of his face, a black eye, a band-aid covering a hairless eyebrow, a bandage on his arm. The word out was that “Jack fainted and slipped in the bathroom”. Whether this really was the cause of his bruises is unknown, although it really looked like someone pummeled him (it wasn’t me!). The immediate consequence of Jack’s sad state was that he was unavailable to entertain the NSF lady. He was replaced by another trusted NSI fellow. My exclusion from all of this was absurd, and I decided to talk to Jack about the issues troubling me recently, such as his shutting me out of grants, talks, and meetings with relevant people. I wanted to probe his take on NSI and Fineman in general. It was entirely plausible to me that his hands were tied in a way, and I wanted to give him the opportunity to voice that, just to know that there might be a future for me at NSI beyond the current Byzantine state.

Anja and I had recently entertained a number of outrageous theories regarding Jack, to explain his behavior and subsequent bruises. Some were plausible, others just funny: Jack was a closeted homosexual, a “beard” for his prominent lesbian wife, hence his reflexive deceitfulness (and, his “wife” beat him up). Or: he’s waiting for Fineman to keel over, then he’ll be the obvious next head of NSI. Or, he’s looking for a job, hence all his traveling and self-promotion. Whatever it was, I needed to talk to him before our stories got out of hand.

I phoned Jack a few times at home, trying to set up a dinner with him at a restaurant, where we could talk openly with each other. He was still beat-up, and postponed for a while. Then, we settled on Anthony’s fish grotto by the waterfront, and I was happy to finally have a chance to discuss the things troubling me with Jack. I picked him up from work, and we drove down together all the way downtown, talking pleasantries down the evening rush hour. In anticipation of this cathartic moment, I left

my car lights on when I parked it. We sat down and both ordered fish, talking some more pleasantries. Like being on a date, I figured it was up to me to progress from a little less talk and a lot more action. He must have expected I was serious about something, but never gave an opening. Nervous, I embarked on my concerns (the rational ones, that is): He was keeping me in the dark about grants, talks, conferences, everything; why? Then, how did he see the future of the institute after Fineman (who was in his late seventies, after all)? Was there a plan afoot? Was Jack being groomed? Before really getting to the meat of the matter, I was struck by his early responses. He reflexively launched into classic NSI propaganda-speak: how Fineman was one of the greatest minds he knew, how the place was a horizontal structure without hierarchies, a perfect place to do science. He boasted that he had found a good understanding with Fineman (implying I hadn't?), without betraying any awareness that it was precisely this "understanding" which made life hard for the likes of me, Doug, Paul, and several others who had since left. I immediately saw that he wouldn't budge, that he wouldn't put his cards on the table as well. After six and a half years of cohabitation, of publishing together, of expressing his interest in my staying at the institute, Jack was unwilling to take off his expressionless mask and discuss these matters that troubled me. Maybe he was being cautious, as ever. As he sipped his herbal tea, he just presented me with a brick wall by re-iterating his quote "*Take care of your science, Bruno, and your science will take care of you.*" This was so Tom-like in its hypocrisy, because the obvious correction was: "*Take care of your science, Bruno, and your science will take care of Jack.*" I just couldn't go there, it would be a personal attack. Maybe I should have. Frustrated, I went on about the things that bothered me at NSI. For example, I wondered about Fineman and whether he didn't care about the fly group, whether he was just motivated to get a second Nobel Prize, for consciousness. I complained about Fineman's interactions with me. I complained about my salary, said I felt I was being taken advantage of. I went overboard, criticizing Fineman's running of the place, but I needed to get it out. Jack soon clammed up, like Tom after my dragging God into the debate. The parallel with Tom was striking and frustrating, but here my job was at stake. Jack concluded that I really needed to get out of the institute as soon as possible. I agreed. When we walked back to the car, I saw that my headlights had been on the whole time, a final metaphor for the light I was trying to shine

on the situation, I guess. I offered Jack a ride home to Coronado, but he declined and took the ferry across the water to his island.

I returned home convinced now that I had to leave, to find a job elsewhere. I couldn't even rely on Jack for having an open discussion about problems at the institute (after all, the place suffered continuous defections, for generally the same reasons I brought up). It was clear what side he saw his bread was buttered, and that he would always look out for himself first, even if it was to the detriment of the fly group. This was very clear now, and a bit saddening, but I knew what I had to do. Getting a job elsewhere would probably mean moving my entire family away from San Diego, our home, where our three kids were born and now going to school. Returning home, I revealed this understanding to Anja, and we both started thinking about our inevitable move. In the end, all I would still ask from Jack, after seven years, was a letter of recommendation.

The next morning, first thing, Jack called me up to his office. He looked worn out, more sickly than usual, on top of his bruised-up face. It was clear he'd thought a lot about what I said, about my criticisms of NSI and Jack's relationship with Fineman. But, instead of trying to reach out to me, Jack unloaded a long monologue attempting to, point-by-point, exonerate himself from my criticisms. He then stated, numbering with his fingers, the ways he had supported me over the years: one, he had always left me alone and given me total freedom, two, he supported my promotion to "Associate Fellow", three, he let me have Kris, my eventual technician who I inherited from his lab, four, he supported my move into an unused room, where I installed my "lab." His pinky still curled searching for a fifth point, I immediately agreed that he did indeed do all this. I was amazed that he didn't see the silliness: Total freedom? Unused rooms? Half the labs were a junkyard, abandoned by previous defectors. I was just filling a vacuum. Kris, a UCSD undergrad at the time, had wanted to work with me, bored silly of just maintaining Jack's fly stocks. He wasn't just a commodity to be passed around (he eventually published a paper with me – after a fight to get him on the paper, which Jack never backed me on). Then, my promotion was natural if I stayed at NSI; one isn't expected to remain a post-doc forever (in fact, it's not allowed if you've got federal funding). Finally, most incredibly, Jack claiming his lack of interest and involvement in the lab as some kind of active, strategic, free-spirited benevolence on his part was ridiculous. It was like a

dead-beat dad taking credit for the inner strength of a tough child who had to fend for himself. Once again, this rationalization reminded me of Tom, the theologian. I once had a debate with Tom about western civilization, where I suggested that the major advances in our civilization had less to do with moralizing Christianity, and more to do with adventures who went out on a limb, crossed an ocean, took risks. Some of these adventures may have been Christians, but that was more incidental to personality traits that led to what we have today. Tom, on the other hand, would argue that all that is good in western civilization (democracy, low infant mortality, technology, laws) is a direct result of Christianity. Essentially, popes and priests could claim Western progress as a direct consequence of their maintaining a moral order. I disagreed with this view quite strongly, feeling that the West rose *despite* popes and priests, especially despite Catholic dogmas, and I even wrote an essay on these thoughts which I never had the courage to give to Tom, worried it might offend and estrange him (it's at the end, wild stuff). Now, I was listening to Jack congratulate himself for being so "hands-off" with me, that this was somehow causal to my scientific progress. Did he believe this? After Jack finished exonerating himself, I simply agreed (while being baffled), and I stated that I had always respected him (without saying "until now"), but that he nevertheless "blew it" and that I would be looking for a job. It was terse parting criticism, and I would regret it.

It was soon clear that Jack had regurgitated some of the contents of our dinner conversation to Fineman, that very day. Fineman would not speak to me again at all for two years, would not acknowledge my existence. It was like a Holy Roman emperor considering somebody already dead, a prequel to execution (which he could not do, living in the modern secular West). I was now the personification of Fineman's demons, a walking betrayal to remind him of the long list of others who had betrayed him but escaped. Meanwhile, Jack basked in the rewarding glow of having demonstrated his loyalty, still holding his cards close to his chest though.

Before sending out my applications for jobs, I had another conversation with Jack. I was hoping to give UCSD a shot, so that my family could stay in San Diego. I'd already told Jack a couple times that I was very interested in trying for UCSD. But I knew that this might not be in Fineman's interests. If NSI was such a great place, better than the rest (that was his mantra), then why should anyone want to jump ship locally? A move to the

Midwest or back to Europe can always be explained with family reasons, or failure, but a move to UCSD would make NSI look bad. None of the previous defectors had managed this coup, including luminaries such as Carlos. It was almost as if Fineman might prefer us to end up in mediocre places after NSI, to fail in a way, as this would validate successes achieved at NSI years prior to our mistaken path of departure. Anyway, that was the feeling among us in the trenches. I flat out voiced this concern to Jack, that Fineman might not want me at UCSD. He answered that this worry was completely unfounded, saying that Fineman had no influence, that Fineman didn't know anybody and that people wouldn't listen to him anyway. I couldn't help noticing a tiny smirk on Jack's otherwise expressionless gray face, but I thought it was directed to Fineman, not to me. Jack was laughing at me, in retrospect.

I wrote up a research statement and left it on Jack's keyboard in his office for comments. He never bothered to give me any criticism, so I prepared my CV and applications, and feeling quite confident applied to UCSD and 25 other places across the country. I was confident because even before having applied, I had already lined up an interview at the University of Massachusetts. A colleague who liked my research, with whom I had taught a summer course in New York, had put in my name for their faculty search there. I was so sure that I'd get a job somewhere that I even felt bad for UMass already, knowing that there was little chance I'd want to move my family to Worcester, Massachusetts while we were so happy here in San Diego. But, like a teenager, I felt I would need practice until the real thing came along.

I didn't get a single interview, apart from Worcester Massachusetts, that first year. This disturbed me because I had a very good publication record and had an exciting research program, I felt. But, following my Worcester interview in February of that year (which I had postponed as long as possible so that they wouldn't give me an offer too early!), I realized that I hadn't planned my application very well. Presenting yourself in a marketable way to universities is a craft, and I had absolutely no guidance and practice. I just assumed that people would be as fascinated by my research direction as I was, and hadn't considered the need to convince faculty that I could pay for myself with grants. I had never asked for advice on these matters from Jack because my departure from NSI was already a touchy matter loaded with confrontation, and besides he hadn't shown any

interest in guiding me. After failing to convince UMass of my worth, and failing to garner even a single interview from the 25 other places (including Wash U and UCSD), I reconsidered my position. It was of course easy to blame Jack at this point: all he needed to do was pick up the phone and tell people, as he had told me, that I was “the best”. He had himself been invited all over the map to talk mostly about my work. In a moment of paranoia, I even wondered whether he was sabotaging me. I called up Bjorn, an NSI defector now at Indiana University, where I had applied, and asked about Jack letter. Bjorn didn't know, but advised me strongly not to use Jack for my letters of recommendation, saying that he was basically dishonest. We all respected Bjorn, even Jack respects Bjorn, so I took this advice seriously, more seriously than when Paul, a more recent escapee, advised the same thing. But, I concluded that it was impossible. I had been on good terms with Jack for most of my time at NSI, we'd published so much together, and it would be just plain immoral and short-sighted for him to write me a bad letter. Paul and Bjorn were just sour.

On my way back from my one interview in Worcester, Massachusetts, I stopped at Brandeis University to visit my original mentor, Jeff Hall, from my undergraduate days. It's fun to see old haunts again, to let memories hit you unexpectedly around every corner: the smell of fly food in the battered old elevator, the same hallway down to the *Drosophila Arms*, dogs yelping in Jeff's office, Adriana a little older but just as feisty, now in low-rise jeans. It was wonderful to be talking to Jeff again, I had loved his vocabulary and thought processes, aside from his science. They had a lab meeting, and I was amazed to witness a real lab meeting again, with Jeff commenting, making criticisms, moving the projects along. Why wasn't Jack like this? Later, we talked for an hour in Jeff's office, penis-like photographs of fly larvae behind him, and I remembered how I had relished his intensity, combined with humor, tinged with madness. However, Jeff was feeling negative and took this opportunity to ream Jack on certain issues. He was annoyed at how Jack never pursued anything, jumping from one flashy topic to another (I thought, well, from one postdoc to another, really). Then he proceeded to tear apart Jack's take on gene networks, how sloppy, ignorant, and ill-intentioned it all was. I knew where this was coming from, and let him rant. After about half-an-hour of this, I tried to guide the conversation to what interested me more, Jack himself: could I trust him in

writing my letters? Jeff should know. Jeff hemmed and hawed but said I absolutely needed to find out what Jack had written, whether Jack had written a “poison letter”. He suggested that Jack had it in him to be dishonest (he gave some examples) and repeated that that I needed to find out.

I respect Jeff’s opinion tremendously. It’s because of him to a large extent that I am where I am today, because of him that I started on *Drosophila*, because of him that I went to Wash U (albeit, a misinterpretation of his words), because of him that I went to NSI (he suggested Jack), so I take his words seriously. However, I also felt that I may have caught him on a bad day; he is notoriously moody. It was a dilemma. The solution of course was simple: take Jack off my list, it’s actually somewhat common for there to be fundamental disagreements between advisors and their charges, and search committees would understand this. However, Jack had happily agreed to write a letter for me. If there had been a strong disagreement on his part, if he felt that I didn’t deserve a great letter (it has to be great, you see), he would have declined. Ruminating and undecided, I thought a bit more about Jack’s influence. Going to a few conferences recently and visiting a couple labs, I was struck that everyone knew Jack, even outside his field. Recall, he had given a slew of talks recently. In principle this should have been to my advantage, to have a semi-famous advisor. However, I soon realized that it wasn’t really helpful to be associated with Jack. People would say: “*Oh yes, I remember, he gave a talk in my department once. It was all about fly consciousness, pretty flakey. Is that what you’re doing?*” Or, they’d ask “*What exactly does Jack do again? Geotaxis? Gene Networks? Attention? Aggression? Sleep? What’s his focus?*” By covering a diversity of problems without pursuing any in depth yet (really, just a reflection of a bunch of desperate postdocs starting out on their own), only Jack himself was interesting and we were not so interesting. Universities want something solid, and by being associated with Jack, we seemed wishy-washy. What exactly does Jack do? Recently, Jack had even begun to dabble with jellyfish and paramecia, wanting to look for sleep in those primitive animals – taking his cue Paul’s original take on flies. As usual, he wasn’t in the lab but delegated work to increasingly lost and disillusioned technicians who just tried to keep the creatures alive. Jeff’s criticism was right on: Jack had no focus. His talks might display a Victorian-like diversity of interests, but for a faculty search, this does not

portray useful momentum. Search committees want mini-Terry Sejnowski's, or mini-Richard Axel's, people who will be able to create a solid outpost from proven labs with valuable techniques and financial clout. No one wants a mini-Jack.



“On the move.”

After a long dry Spring devoid of interviews and the final trickle of “thank you for applying and good luck” letters ended, I started bracing myself for the next round of applications starting in the fall. It’s a humbling thing, this business of applying for faculty positions. Poor Tom had gone through three rounds of it, about 200 applications in all. In the end, he finally got a job that Spring at Minnesota State, Mankato. After publishing his geotaxis paper, he’d been on 18 interviews over the three years. He’d come back looking a bit puffier and older after each trip; he hated the whole process. In the end, we were all rooting for him. I wanted him to get a job at a good place where he would be happy. It’s a strange thing, how you can be enemies at some levels and allies at others. He had been in the trenches with us. I remember the moment of redemption, when the deadline was approaching for Mankato State, his final option, to call him back with an offer or a rejection. He’d already been given the boot by NSI and had negotiated an extension, and was seriously considering becoming a high school teacher. Tom sat at his desk at 2:45 pm (a quarter to five in Minnesota), trying not to look at the phone. I said “I have good feeling about this, Tom,” and he tried to put on a brave face. Ten minutes later, Tom was in my little electrophysiology room beaming that he’d just gotten the call: Mankato offered him a job. He’s there today, teaching Biology to undergrads. There’s a strange symmetry to his getting a faculty job in Minnesota: before his science career, before his marriage, even before college, Tom had been in a seminary, a training ground for priests, in Minnesota. Why he left was always a mystery to me. He’s still in at Mankato today.

That summer, I got my own boot from NSI: I was given exactly a year to get out, so I had to get something in the next round of applications. I expected this, but it was galling. After all, there were two full years of funding still available on that infamous NSF grant, and I was the only one working on the proposed project, as far as I could tell. The grant was never discussed again by Jack or anybody, after its painful conception. Typically, regular meetings are held, tasks are delegated, progress is assessed, and reported. Instead the half million somehow sunk into the general NSI budget, and I kept on doing the work I had always planned to do. Jack quietly lifted paragraphs from my papers to satisfy the annual progress report that was required, without ever asking me for anything. He must have typed them out, copying the abstract from the pdf, verbatim.

Having leaving on your mind is not a healthy state of being, for an individual or a family. We had started our life in San Diego with dreams of staying: we bought a house, planted fruit trees, built an addition when the house got too small for five people, “choiced” our kids into a better neighborhood school, so they wouldn’t have to go to our crappy local high school when they were teen-agers. I had viewed my work as a long-term thing as well, hence my almost autistic lack of networking beyond NSI in order to secure possible connections and interviews. Now, we had leaving on our mind for already a year: writing innuendoes in our Christmas letters suggesting that our kids might be enjoying snow again next year, holding off on remodeling our tiny kitchen, not watering the small fig tree as enthusiastically as before. And now we faced another whole round of this, of not really knowing where we’d be next year. Some families fall apart over this kind of stuff (just get a non-academic job, Bruno!). We kept it together, partly because we were still very happy with our lives, helping our children grow.

I told Jack about my one-year ultimatum, and he said he was not aware of this, swallowing deeply before he spoke. I then asked him whether he’d send another round of letters of recommendation for me. He agreed to.

I had carefully considered the cautionary advice of three colleagues (Paul, Bjorn, and Jeff Hall), and finally decided in favor of asking Jack’s help again. It just didn’t make sense not to ask him. He obviously thought highly of my science – he always spoke about it – and now he knew that I *had* to leave in a year; Fineman, his own boss, was making me leave. If I didn’t find a job, then I’d be out of NSI with nothing at all. He had to help me: Fineman demanded it in an indirect way. In addition, I began to suspect that the real cause of my lack of interviews was my poorly written research statement. Indeed, when I sent it out to several colleagues, some of them established professors, it got seriously reamed for lack of direction. Mike Nonet at Wash U, who had been on my PhD committee there, said it was terrible, writing a long list of criticisms and advice. Mike Crowder also helped, and slowly I crafted a more realistic statement. I also gave it to Jack to read again, and he only said that I should insert more “molecular-cellular” lingo for those kind of departments, which I did. I was extremely relieved in a way that the problem was unlikely to be my letters of recommendation. Following Jeff Hall’s advice, I had finally asked Mike Nonet at Wash U about weak areas in my application, and he said

that “the letters were not the problem, it’s the research statement.” After working hard to fix my research statement, sending it back and forth several times among at least four professors, I crafted something better. I was very happy to be relieved of that huge worry: Jack’s letter. He’d help me. He might not pick up the phone to get me a job, people might not want a mini-Jack, but at least he wasn’t sabotaging anything. I was re-invigorated and sent out about 60 applications that fall. I applied everywhere a job seemed available, across the board, and personalizing to individual departments. It was hard work.

We made it a production line at home. I’d email Anja lists of job openings, which she’d organize by their application deadlines and requirements. We bought a laser printer (which we had a terrible time interfacing with our old computer, we had to re-install it several times a day). In a way, Anja wanted to be part of this process, to see where applications were being sent, perhaps imagining to herself each time how it would be living in Evanston, Illinois (close to her parents!) or Los Angeles (yuck!). Jesse, still a baby, would “help” retrieve the sheets from the printer, and the pages were collated on the dinner table. Then, while the girls were at school, Anja would stroll Jesse to the post office with packs of manila envelopes (hard copies, back then), her heart maybe skipping a beat when the University of Chicago or UCSD envelope slipped into the slot. I teased Anja with application materials for some university in Haifa, Israel, and, only half-teasing with material for some place in Australia. I had always wanted to go to Australia. I knew Anja really wanted to stay in San Diego, or at least go back to the Midwest.

Before my disgrace, I had regularly been asked to perform for official functions at NSI, often with very short notice. This included showing visitors my fly circus, but also giving talks for the foundation’s board, or at the yearly NRP meeting. They liked me because I was a hard-working brash young scientist, a risk taker, a maverick: the kind of material that makes rich old donors feel good. Yet, talking to the board was always a bit awkward because we had to portray excitement, sophistication, and simplicity at the same time. These presentations were always strong-armed by the Fineman, and this was always somewhat offensive to all of us, as if we grownups couldn’t really be trusted with our material. But we understood the reasons. After announcing my intended departure from NSI, I was never again asked to talk, let alone even show people a fly. I didn’t exist anymore. More often, Jack was asked to perform his trusted routine.

In the Fall of 2006, NSI celebrated its 25th anniversary. Board members convened in San Diego, gala dinners were put together, and talks from various labs were organized, as well as lab tours. As expected, I wasn't asked to participate, but I showed up anyway for the talks, which were held in our acoustically renowned auditorium (which, oddly, attracted very few scientific events). Now witnessing the whole affair one step removed, I was amazed at how odd it all was. First, the need to make the gathering look prestigious by being cagey about invitations, followed by the sudden last minute scramble to fill the half-empty audience with warm bodies recruited by email from the labs. As Fineman, almost inaudibly, commented on the "extended NSI family", I was struck by how inappropriate his comment was. Not a single previous scientist who had worked at NSI had bothered to show up for this momentous anniversary (no, there was one: a British post-doc who still lived in San Diego, working in industry). Like some small town in the Ozarks, if you left NSI, you never came back. It was a chilling realization. Then, Fineman launched (we strained our ears) onto presenting the cadre of young scientists lined up to speak about their work. I looked down at short line of grizzled heads, including Jack's, and not one was below 40: all were trusted members of the chancellor's circle, on a tight leash (one of them would soon betray Fineman, having planned his escape to academia in secret). Fineman gave a brief overview of ongoing research at NSI, even showing my photo of a fly with glass electrodes glued into its head. But, he was careful to only mention Doug's name in relation to the picture. Fineman then concluded his intro with a surprising miscalculation, for a smart man: he brought out his pet robot onto stage, the star of NSI. Recently, there had been some media attention paid to autonomous robots (made by Honda) that looked pretty good and life-like. We'd all seen them on TV, including Fineman and the Board, most likely. Not to be outdone, Fineman called out his robot, "Argo!", and out onto stage rolled what looked like a small remote-controlled tank. It stopped in front of him. Fineman said "sit!", and Argo performed an arthritic squat. It then raised itself, and wheeled away off stage. It was so clunkily unconscious and so far removed from the seamless robots we're all familiar with from science fiction movies, that I wondered if some gasps I heard were of pure embarrassment. Now, don't get me wrong: I know that there's some excellent science behind what our colleagues were trying to achieve via that robot, but it didn't look good

to the lay person: Fineman looked like a used-car salesman. Worse, every employee of NSI sitting in the audience knew that the robot was actually being remote-controlled today, like a Wal-Mart toy, by Donald the engineer behind the curtain, offstage with his radio transponder. It was a hoax. Of course, we also knew that the robot *could* navigate on its own (in a controlled setting) but it was not autonomous for today's particularly delicate circumstances. Even though some (probably very old) guests may have been impressed, one should consider more importantly the effect such a hoax had on us, the scientists who give life to NSI. I looked around the audience: Doug was staring at his shoes. Technicians snickered. Betsy had a frozen grin on her face. It made us feel bad, and made us all think the place was a bit of a joke, probably.

Having passed that hurdle (I was sincerely in pain on NSI's behalf; I'm actually extremely empathetic – or pathetic – on those kinds of occasions; I can't stand watching a bad movie in the theaters because I worry about what a bad time all the others must be having; ice-skating competitions on TV are torture for me, I'm so worried she's going to slip; since childhood, this often culminates in a bad case of the giggles, which I feel bad about later), we then proceeded to the meat of the matter, the talks by our young (Fineman repeated this!) investigators. Jack, fifty-six and hunched, gave a short, terrible talk, the worst of his I'd witnessed. In stark contrast with all of his outside lectures, he avoided all direct reference to any of my work; he toed the line. But it cramped his style; he wasn't used to having to repress his material. He started on a stripped-down version of his gene-networks extended metaphor (Newton, Darwin, and Jackson Pollack), and then switched confusingly to fly aggression by airing Herman's long video of fighting flies, adding the "Rocky" soundtrack for a laugh as he's prone to do. Confused, no-one laughed, and Jack, like a faltering stand-up comic, aborted the movie before it was over and moved on to a general conclusion about how everything was "messy" in biology. An old man sitting next to me scribbled "Biology: messy" next to Jack's name in the brochure. Aside from Jack, others tried to give good talks (poor Eugene, our Russian mathematician, gave it his heart and soul: this is such a great place to do my work). But, the flow was all incoherent. We moved from computer models to caffeine to gene networks to robots to musical elephants. What held us together, as a research institute? Just Fineman? The audience, all of us, must have been reminded: yes, only Fineman

keeps this place together; after him, the deluge. Why couldn't we have portrayed a common goal, like learning, or even consciousness? I now saw that the choreography was very narrow-minded, like a laborious school performance where each class does something completely different and the parents are bored stiff by the end, long after L'il Lene and Tiny Tess have done their song and dance. The old man next to me fell asleep before the show was over.

I'm actually being unfair about school plays. My daughters' elementary school each year organized a beautifully choreographed school musical, always centered around a common theme and completely written and produced by the parents and teachers. This extravaganza included a variety of costumes, dance routines, songs, and imaginative segue ways between the different shows. Unlike Fineman, the school's Principal was appropriately irrelevant in this regard, except when they needed him to strut or bang the bongos; the school was self-sustained and people's combined motivation meshed beautifully to produce something truly excellent (albeit still boring at times). Why couldn't we do this at NSI? We were smart people, and three full-time PR staff.

When my daughters started going to school, I became involved in doing science presentations for their classes. Small kids have very short attention spans, and doing a fruit fly demo for a class-full of kindergarteners is among the hardest things I'd done in years. By the end of it, I'd be wiped out and drenched in sweat from coordinating all these little humans through an hour of organized scientific activity. Each time, I learned something valuable about how to best do a class, tipping my hat meanwhile to the school teachers who do this every day quite successfully. Then, I'd pack up all my gear and drive back to work, to NSI. Re-entry to the institute was always particularly striking after teaching kids. The place was dead. I'd walk down the long empty hallway, seeing nobody, hearing nothing. Peering down a lab space, I might see a technician playing solitaire on their computer, like a symbolic form of rebellion. A post doc might be staring at another computer, processing some data day after day, week after week, in the distant hopes of gathering material for a publication. I thought: this loneliness isn't normal! Nothing happens here! This isn't what science is about, what life is about! And, it became more apparent to me after all these years of solitude that NSI wasn't normal. The official view stated that we were "free from the constraints of committee-meetings, free

from writing grants, free from having to teach, free to interact equally according to our own motivations.” But, in truth, we in the “wet” wing of NSI were just abandoned, especially the fly group. The robotics work (“Argo” now fully supported by the military, who needed a soldier-robot) was the main focus of NSI, Fineman’s pride and joy, and we were just filler material to make the place look busy, albeit unsuccessfully. You could tell this in the way Fineman traipsed hurriedly through our labs when he had to show guests, increasingly military-types, around: He’d open a door halfway, let some colonel quickly take a peep, and say “this is where they work on the genetics of sleep” (who was doing this? Paul was gone). He was embarrassed of the labs, and with reason: they felt like an abandoned junkyard, with scientists playing solitaire.

I understand that it’s hard to find funding for an institute, and I don’t envy Gunnar and Fineman’s constant headache at securing financial stability for the place. Still, NSI excluded us from applying for our own grants in order to perpetuate the myth that the place was independent from granting agencies. But, like me, almost everyone was involved in some semi-secret, murky grant or other, without clear authority or accountability. Only NIH (National Institutes of Health) grants were still completely forbidden, as if Fineman held a special grudge against that powerful agency. Freedom from NIH was now claimed as the thing that made us different, that allowed us to think more creatively. Meanwhile, our largest sponsor was the military in need of a robot-soldier.

The official policy of freedom, like something out of *Animal Farm*, was a lame duck. There’s nothing wrong with being regularly held accountable by meetings, grant writing, and teaching. I believe it makes you smarter and breeds honesty, at least to yourself. Upon NSI’s foundation, Fineman had probably imagined a highly prestigious place populated by well-established scientific heavyweights and thinkers longing for some monastic quiet to let their genius flourish. However, this hadn’t exactly panned out, and instead we were just a bunch of very junior home-grown fellows and technicians condemned to the scientific equivalent of solitary confinement. Morale was especially poor among the technicians because, in addition to little sense of purpose, they were “not encouraged” to appear on NSI publications (a remnant of the original snob-factor). Any motivated tech would of course leave, and those who stayed became bitter or lazy. I saw

Jenny, who started out bright and motivated, slowly turn resentful and sarcastic like Ann, my unpleasant first colleague in Jack's lab. Among post-docs and fellows, a good publication was of course a ticket out of our freedom isle.

The analogy of NSI to George Orwell's *Animal Farm* only hit me when I re-read the short book to my eldest daughter over a couple evenings. In the story, humans are overthrown and the farm animals establish a human-free utopia. The utopia disintegrates into a mini-version of the classic human state, which is all about power and control: Surely, you don't want to go back to how life was like in the old days, when we had to write grants? Or: All scientists are equal, but some are more equal than others. Or: Those who left NSI were in retrospect all ungrateful bastards, undeserving to be here anyway. Looking around, those of us still trapped at NSI even seemed to resemble some of the animal archetypes in the story. It's a great book.

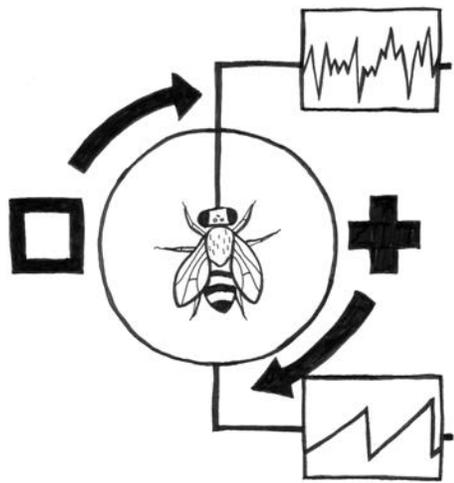
I feel like, for a long time, I was most like Boxer the old horse who believed in *Animal Farm*. His motto was "*I will work harder,*" as he killed himself hauling rocks to build a windmill on a hill, over and over again after it got repeatedly destroyed. My windmills, like every hopeful scientist, were publications. Although I published well during my tenure at NSI, every single publication was a struggle. My reaction to criticisms from reviewers was typically "*I will work harder*", by doing a whole new set of experiments or re-writing or re-analyzing. I think this is not unusual for scientists, we're all Boxers in a way (but we usually don't espouse the second line of his motto: "*Napoleon is always right*"). When I was promoted to Associate Fellow, I started trying to publish on my own (without Jack). As always, reviews were harsh, but I had a particularly hard time with one paper I was trying to publish, on my novel fly attention paradigms. Perhaps now without Jack as a co-author, I lacked an old-boy entry to certain journals. In any case, I always gave Jack versions of the manuscript for his comments, as well as every other paper I was working on. Now that Jack wasn't an author, it seemed like he barely read my manuscripts. Sometimes, I'd be lucky if I had five red comments from him in the entire paper, usually clustered in the abstract section. Other colleagues would blacken the pages with suggested sentences, question marks, arrows, like normal reviewers, like I would do for them. Bracing myself, I'd gather more data, re-write the paper entirely, try to present all in a new angle, only to be destroyed by the next set of

referees. It was, after all, provocative work, all on fly attention. After about two years of adapting to different referee comments, I finally had a set of data I felt would satisfy everybody, wherever it went. I aimed high, for the journal *Science*. Well before submitting, I again distributed this changed manuscript to several people, including Jack. This time, Jack's comments were only verbal (his sheaf was still entirely virgin), and restricted to my title. I changed the title, addressed Herman and Rozi's criticisms, submitted, and hoped for the best. There's a big luck component to publications: what editors are looking for at the time, and then who you get as reviewers, for starters.

Jack's mind was on the Matrix results, which he wanted to transform into a manuscript. Eventually, almost any dialogue between us reduced to Matrix-speak. He wanted to get a move-on, much like with my Syntaxin results from so long ago (which gave him a half-million, after all). Meanwhile, the fact that I was scrambling for a job and trying to publish on my real work seemed irrelevant to him. When he saw me, he saw the Matrix, and how it might slip through his fingers when I left. Once, he even interrupted Fineman. The old man, for the first time in two years, broke his code of silence toward me (we were sitting waiting for some perfunctory safety lecture). Fineman asked me how my job search was going, looking concerned. Shocked, I answered as accurately as I could (I hadn't heard much, it was still early). In the middle of this, Jack, sitting between us, interjected with an irrelevant comment on my decision to normalize the Matrix data, thereby snuffing the only communication I'd had with Fineman since I told him I was looking for a job, and any interaction I've had since.

Jack's Matrix-speak (not really about data, but more about our need to get things moving toward publication) reminded me of Dr Derg at Wash U. When I was in Berg's lab, I had written a paper about genetic diversity in *Dirofilaria immitis* (heartworm in dogs), a study I had done as a PhD rotation student in his lab, prior to joining his lab. It was the first paper I had ever written, and with Dr Derg and Dr Weil (who got me the worms) I sent it for peer review to the *Journal of Parasitology*. The reviewers were harsh, and resubmitting would have involved a lot more work. As this was just a rotation project, not my current research plan, I stalled a bit. I was just a new grad student, figuring things out. When I took my preliminary examinations, after my second year, I failed. Population genetics is not easy, and I had some tough cookies on my committee.

Dr Derg, as my thesis advisor, was also on my committee, but didn't know any population genetics (he's a microbiologist). Probably feeling peripheral, he made it a requirement that I publish the heartworm paper for me to pass my prelims. I felt this was out of line and unnecessary (learning population genetics was necessary) and soured me on him; he just wanted another paper. Eventually, I would bail from his lab, that sad demoralizing place. I spent the summer of my third year hiding out in the library reading newspapers or building model airplanes at Anja's apartment (I had recently met Anja, also a grad student, in immunology). Because I didn't have a lab, I was very close to dropping out of Wash U. One Idea I had was moving to Australia, to Queensland specifically. I was always fascinated by the place, and I wanted to start anew at the University of Queensland, in Brisbane. I wrote to them and got application materials to do a PhD (I remember, a backwater-looking place, with grainy black and white photographs). But, instead I fell in love with Anja and stayed in St Louis, and tried to make the most of Wash U. It ended up working out, I worked with Mike Crowder (who was still himself a postdoc at the time) on *C. elegans* behavior and anesthesia, a great project really in a small but happy lab. But, the saga of Dr Derg was not over. Throughout my remaining three years in grad school, whenever I ran into Dr Derg, he'd ask me "Have you worked on the manuscript? We really have to re-submit the manuscript." He'd say this in the hallway, in the cafeteria, in the library, his grizzled head poking out from behind some stacks. And, he never asked about anything else. It became comical. Today, "*The Manuscript*" still sits in an envelope on my bookshelf, edited and still un-submitted, my Derg memento. Today, Dr Derg is a professor at UCSD, still looking grizzled. Now Jack needed his Matrix, his snake-oil wonder potion, urgently.



“Choices.”

I wonder about fate sometimes, whether it's just us noticing what we want to see, or whether inherent character traits make some outcomes more likely. Among my applications for jobs this second round, I had sent one to the University of Queensland, to a new brain institute there. They replied extremely enthusiastically to my application, and to Anja's dismay, we set up an interview for February 2007 in Brisbane. From the 64 other applications I had sent, all of them in the US, only two resulted in interviews: The University of Oklahoma, and Carnegie Mellon in Pittsburgh. This was much worse than Tom, with his 10% return and single publication (I had 10 papers from NSI by then). Although I was happy to get the interviews, I began to wonder about Jack's influence again. Both Oklahoma and Carnegie Mellon were teaching-intensive positions, which might have limited my research (although I like to teach, but not necessarily physiology 101), and Australia was abroad. It smelled fishy.

I decided, again, that I had to find out if my letters were OK, a sick feeling all over again. The application season wasn't over yet, and often a spate of new offerings come up in the early Spring. I clenched my teeth and sought out (in person) a local professor who I knew would have seen my materials at some point in the past two years. In this way, I was really sacrificing UCSD as a possibility, because it doesn't do you any good to go nosing around about your letters. But, I had to. It was embarrassing, asking. The professor understood my predicament and said they'd get back to me. I waited. I emailed, set up another appointment. Sitting again in that office, we got straight to the point:

Professor: Yes, I looked at your application again, and the only problem really is Jack. He writes in his letter that *you don't take criticism well*.

Me (*stunned*): I don't take criticism well? I don't understand...that...that just kills my application...doesn't it?

Professor (*nodding, grimacing*): Well, yes, it's a small thing...

I was completely floored, I had to go home. Driving home, I pictured Anja and Jesse making a game of packaging all those applications, and Anja's courage and hope in the whole process. The whole batch were probably duds if Jack included that line in all of my applications; I was extremely lucky to even get three interviews. Criticism is what science is all about; nobody in science wants to have a colleague or a subordinate who can't take criticism. Criticism is not only how you do good science, it's also how you become a good team player, something every department is looking for. This line was very bad news, and my UCSD professor knew this.

After talking to Anja that night, I decided that it was maybe not too late, that I might confront Jack about his opinion of me. What criticism, I wondered? I felt I could make a very good case as to how he was very mistaken, and I'd ask him to retract that line out for God's sake, to do some damage-control, the line was hurting me. But, on a whim I queried some old colleagues at Wash U, and found out to my dismay that Jack's letter to Wash U this year again was fine, not extraordinary, but fine, *without the line about my not taking criticism*. Jack was writing different letters, and maybe he knew I'd find out about Wash U's letter since I had close contacts there. This was obviously a strategy on his part, and I had no idea where he might have sent which letter. This of course made a confrontation with him impossible, as he'd feel caught and might try to defend himself in a further unethical way. He might whine enough to Fineman and get me fired on the spot, with my family in tow. I was in a real bind. I had to take it on the chin and move on.

I eventually found out that he'd sent similar poisoned letters to other places, already last year. Maybe Oklahoma, Pittsburgh, and Australia were good letters. It was impossible to know, and at some point it was best to stop wondering and just move on without Jack, as I should have done since the beginning, as I had been advised to do. In retrospect, I have admit his line about criticism is a master-stroke, a carefully prepared poison from someone who really knows this delicate craft of writing and reading recommendation letters. My source at UCSD understood the intention right away. If Jack had wanted to keep me out of the running, he couldn't have done it better. Any other

negative statement might have sounded like sour grapes on his part, but now he exuded the airs of a thoughtful mentor, of having tried at least, which he never had. If I complained about his statement, well, it sort of sounded like I indeed couldn't take criticism, confirming his painful diagnosis. I was stuck. In a way, it was all topsy-turvy: Jack couldn't take the criticism I had dished him at the fish restaurant that night! But, the damage was done, and a school-yard brawl (No! You can't take criticism!) was the last thing I needed. Sadly, Anja and I resigned ourselves to the three upcoming interviews. Our kids would grow up in Oklahoma, Pittsburgh, or Australia; one of them for sure, we hoped.

My secret knowledge now made Jack's physical presence at work singularly disagreeable. Fortunately, he was never in the labs and I only saw him at lunch, where he increasingly sat right next to Fineman. Eventually, I stopped attending these lunches to avoid having to be reminded of him. He sent me emails every so often with Matrix reminders, a la Dr Derg. I was polite.

Every year in January, NSI held a holiday party, with some catered buffet and sometimes a band. These were always stiff affairs, like an extended family that didn't really want to get together. You could tell this was a chore for Fineman; he wasn't too happy with how the institute had degraded from a highly prestigious club to a rabble of driftwood and young turks. Anja and I had attended these events every year, sometimes our only night out away from our babies for the entire year. This year, Anja refused to go: she didn't want to see Jack, or Fineman for that matter. That's how it is with your partner: they get even more riled about injustices done to their spouse than anything done to them. Myself, I'd feel my blood beginning to boil whenever anybody came even a hair close to mocking stay-at-home mothers, so I understand the emotion. That year, I decided to take my eldest daughter Lena along instead, for a change. She was so happy to go on this "date" with papa, she wore her nicest dress. I was happy to oblige, but I also wanted Jack to see Lena. He seemed uninterested in the fact that, these past eight years, I was also raising these children, these mini-me's; like everyone, there was more to me than that narrow wedge we see at work. Also, reciprocally, it was fun for me to show Lena the faces behind the names we sometimes bandied around the dinner table (her imaginary friend's brother was called Jack – a memory of better days – and she called the big boss

“Edamame”, from the soya bean appetizer you get at a sushi place). Lena had a wonderful evening: she got served a Sprite with a fancy straw, she had shrimpy things, and the crowning glory was the chocolate desert. Mingling, we met Jack. I said “Here’s Lena, Jack, I don’t think you’ve seen her since she was a baby.” Jack, standing stiffly, grimaced “Yes” and then immediately stated that he’d just sent his letter of recommendation to U.C. Davis, the final place I had applied to, adding “I’ll do whatever I can. Let’s keep our fingers crossed.” I swallowed a lump of brie, marveling at the smooth hypocrisy, and said nothing while Lena smiled awkwardly up at Jack. Then Jack walked away to safer territory, his fingers probably still crossed. “That was Jack, Lena”, I said. Later, Lena even got to meet Fineman, who still did not acknowledge me but surprisingly bowed down to pleasantly greet my little girl. I was touched. He was human, after all. With regard to my fallout at NSI, I still don’t know how much he knew about Jack’s doings – how much came from Fineman or how much came from Jack. Like the pigs and the humans at the end of *Animal Farm*, it was hard to tell the difference. Like *Animal Farm*, NSI would eventually fall apart. A lot of us blame Jack, more than Fineman.

Fineman is easier to understand than Jack. Already before I went to NSI, people had warned me about Fineman and his control issues. What’s tragic about it all is that, like a father who never is able to concede, Fineman just ended up losing his children. I also saw a tragic bigger picture, related to Tom in a way. How do we avoid becoming Pope-like when we have power? Here’s a secular scientist who’s looking for answers about consciousness, in direct conflict with what all the religionists claim: that there is no soul, only a brain. Yet, to pursue this, he inevitably reverts to behaviorisms which would make the Catholic Popes proud: dogma, control, inflexibility, nepotism, hierarchy; the list goes on. Are we all doomed to become like Tom or Fineman, both “good-old-boys” in their own way, some of us just figuring it out sooner and thus getting more power and control early on? Is there a way out of the classical religious approach to life, with all pain that goes with it when you’re not a member of the club? I hope there is. If I were to write a third letter to Tom, I think it would be a short one along the following lines:

Tom, I understand now about God. You can't just take God away without replacing him with something of value; all you're left with then is someone like Fineman, who would have made a fine rabbi or bishop in another era. What do we secular types have that's of as great value as everything you propose God provides, to guide our behavior along? What can we worship? There doesn't seem to be anything real that stacks up equally to that personification of consciousness, which is your God, which is all the gods. Actually yes, there is one thing. I've been a believer now for almost a decade now: my kids. What can be of greater value than children, even other people's children? Some people would die for their god, September 11 made that all too stark. We now consider them deranged. But, I think a lot of people would reflexively give their life for a child; we wouldn't think twice about jumping off a boat or onto some train tracks to try to help a child, any child; it unifies us, everyone in every culture understands this, more than we understand what God is really all about. We also all understand the value of preparing our kids for a happy life. With children, we don't need priests to remind us of what's sacred – we know already. Shouldn't that be enough? And mentoring youth is a bit like raising children too, it's all about looking to the future. Whichever way you do it, Tom, with or without God, just take good care of them.

Fineman, like Tom and I, also has three children. If I were to guess, I think Fineman probably short-changed his kids a little as a father while they were growing up because, like a priest, he was so busy at the altar of science. I may be wrong, it's just a hunch. This attitude probably also affected his interactions with any scientific relations which could be considered children; too much of a priest, not enough a father. It is easier to be a priest than a father.

Jack was never a mentor, or a father. He's not even a priest. He's a middleman. I understand this now. Beware of the middleman! He knows he has nothing lasting.



“Signing the document.”

Epilogue

Today, Jack is faculty at UCSD, his plan all along. The funny thing in the end is that Jack also gave me exactly what I wanted. When I interviewed in Australia, rather than feeling exiled I realized that this was where I really wanted to be. Like walking through a déjà vu, I felt at home right away at the lively University of Queensland and the new Brain Institute there. Walking around the wonderful River City, I knew this would be my future home, where we would raise our children. Back in the States, my two other interviews, at Carnegie Mellon and Oklahoma, went very well, I had truly been refreshed by the possibility of working there, especially CMU. I got a job offer from CMU, and then from Oklahoma, but had already accepted an offer from Australia by that time. Typically, when you get multiple offers, you're almost expected to play them off of each other in order to raise your value and negotiate for more: the ball's in your court by then. This made no sense to me, I wanted to go to Australia, I was happy with that outcome.

The irony in all of this is that Jack's doings made this decision easier for me. I have to acknowledge this. If Jack had given me honest support, I'm sure I would have gotten more interviews, already the first year when Queensland wasn't looking yet. In the end, it would have been very hard to decide between Australia and, say, the University of Chicago (close to Anja's parents), or San Diego (our home), or Caltech (prestigious), or Wash U (our happy grad school), or anywhere in the Midwest really (Anja hoped for anything there: Iowa, Indiana, Illinois, any nice college town). I don't think I would have moved on west to another country if any of those possibilities had been available. I would have been happy to make a career in an American university. Our kids would have been Americans. Now, instead, they're talking Strine to us, and calling Anja "Mum".

The reason things work out in the end is largely because of the person you're with. If I had had to come home to a sour partner or an empty apartment, I don't think I would have coped as well with my lot at work, especially near the end of NSI. But, I really had a separate life at home that was very happy, and still is. Not every woman would be brave enough to uproot her family for a new life on a distant shore. I admire and thank Anja for everything, through thick and thin. And I also thank Jack in a way, always the middleman. God and his angels in heaven must be laughing now.

Supplementary data

1. A letter to Tom

Having read Tom's essay "What's wrong with biology and biologists? The remote roots of the moral crisis," I feel the need to answer in some way. Let me resume some of his points, as I understand them, first. The secularization of science, and the parallel cornering of religion in society, has led to a current moral crisis. This moral crisis, evidenced by human practices such as abortion, in-vitro fertilization, euthanasia, contraception, and even school shootings, are said to result from man having forgotten that he is a specially created creature, a moral agent uniquely different than animals. This lapse is due not to evil in the average person, but rather, it is due to the materialistic philosophy which has percolated down to average people from secular biologists such as Stephan J. Gould. This philosophy encourages an upside-down or inverted approach to knowledge, where skepticism reigns rather than unquestioned truth or faith. The argument is made that this is not natural, that man proceeds from most-known to least-known, and that by inverting this natural order and replacing faith with skepticism, man loses his moral compass, hence the current moral crisis.

It is probably true that a greater culture of skepticism exists today compared to past eras when religion answered all the questions concerning life, death, and natural phenomena such as the weather. I believe that it is short-sighted to suggest that this is causally related to immorality. First, the assertion that there is a greater moral crisis today is questionable, the daily deluge of TV violence notwithstanding. There probably is no more violence on average today than there was during any era of humanity. The list of offenses is longer than those stated above, from abuse to genocide. Religious certitudes never prevented people from abusing and killing other people, to say the least. There seems to always be a certain level of violence in society, which doesn't make it excusable of course. But, I don't believe that a valid explanation lies in the level of skepticism existing in a society. Other factors, such as the distribution of power, or structure of families and society, or unemployment, or a local surplus of males, are probably much more relevant.

Morality is most likely not affected by the specific sequential order of academic curricula. The essay's suggestion that teaching courses which begin with the least-known (cells, molecules, atoms) and end with the most-known (human behavior) will inject a dose of skepticism and consequent immorality is pseudo-psychological nonsense. One could just as well reverse the argument and suggest that ending a course with the least-known (quarks?) might leave students undirected, unsure, and hence more likely to behave immorally. Further, what is called "most-known," human behavior, isn't necessarily so much more known than the structure of cell or molecules. Of course, what is really well known, my own perception of colors or my sense of self, for example, is quite evident, but I challenge anybody to design an informative course and several textbook chapters around reminding students that the red they see is indeed red, that they are alive and not dead, and that they are not someone else. Such truisms are valuable, but they don't teach anything new since they are known already. Should one be able to prepare several (boring) primary chapters on such truths, one would still have taught nothing except for having students recite a sort of mantra before really starting to learn something new, or perhaps one would have provided ample camouflage for inserting dogma and passing them off as regular "knowns." The structure of a course has value regarding the final consolidation of its subjects, there is no single ideal formula. And there is no reason to believe that a student will lose his moral compass if he learns about one particular subject before another. Further, to suggest that a "priming" regime of self-evident truths (and dogma) will somehow thwart any potential immoral behavior is a very naïve exercise in pedagogy. People aren't automata.

Aristotle's observations that effect follows cause, and that knowledge proceeds from more-known to less-known is of course reasonable. It is inappropriate, however, to draw parallels between this level of attaining knowledge with the more macroscopic organization of syllabi discussed above. Aristotle's logic holds within each level of investigation, but cannot be usefully superimposed on a scale of teaching the disparate subjects in a course. Why not, then, increase the scale yet further, and suggest we start life as a newborn knowing the most and die knowing the least?

Aristotle's valid logic does not lessen the value of knowledge acquired through science. Valuable knowledge, or what's best-known, is not necessarily limited to our immediate

senses but also to what our senses perceive via communication with other reporters, namely other individuals, or often in the case of science, machines. Knowledge acquired via these trusted proxies can be just as valid as our own perception of a color. Good science is not just limited to getting increased precision on already known things; science also extends knowledge by revealing new kinds of knowledge, and sometimes by refuting what was previously so well “known.” New knowledge creates stepping-stones towards more new knowledge, irregardless that these stepping-stones are not 100% known themselves. By this method based on skepticism, knowledge does indeed extend beyond what can be immediately perceived by our, or Aristotle’s, senses. There is little denying that DNA exists, and that diverse animals, including humans, share the same chemical building-blocks. There is little denying that an electro-magnetic spectrum exists beyond the colors which we can perceive. This is knowledge too, just as valid as a subjective perception of the color red. Red is not somehow more valid than microwave or infra-red. Then, what appears to be most-known can often be proven questionable or outright wrong. There are so many examples of this. All our senses tell us that the sun orbits around the earth and not the earth around the sun. Or, the atom, by definition, is the smallest unit of matter. Or, the heart is the seat of love. Knowledge, in such cases, was just delusion, regardless of its certitude. The entire study of the nature of light is filled with such delusions proclaimed as certain because of how our senses responded. Aristotle himself stated quite confidently that vision worked by means of the eye actually sending out a material beam which bounced off an object and was returned to the eye. In a subjective sense, it certainly feels like you’re doing just that when you direct your attention to something, but this explanation is totally wrong. By his well-worn method of categorization by kind, Aristotle chose the wrong, more subjectively-appealing, solution.

Scientific knowledge is thus no less “known” than prior subjective knowledge. Indeed, prior certitudes can be refuted and explained in a different light. Before the modern scientific era, religious certitudes were not only restricted to the immaterial world. They have now been cornered there because science won’t touch that area. There is great irony in this course of events: Religion used to provide answers about the material world, such as the miracle of birth, the changing of the seasons, etc. Once these aspects of the material world were explained by science, religious certitudes retreated into what is left

unexplained, such as human consciousness. The irony lies in this as-of-yet unexplained preserve now being referred to as the “most-known” by its new self-proclaimed landlords, regardless of the likelihood that they lay claim to this domain precisely because it is still least explained, unlike the seasons. Should there actually have been scientific evidence documenting a fundamental difference between human DNA and all other DNA, religions would have bought it wholesale and revered such material proof. Since this does not appear to be the case, the sultans of certitude are left to claim what remains, such as the mind.

The certitude that there is a difference in kind between humans and animals may be just another one of those knowns, awaiting explanation before retreating to more remote pastures. That which makes a human unique is probably related to that which makes a dog unique to another dog or a fly to a fly. We recognize and place greater value on our conspecifics for obvious selective purposes. There is nothing uniquely human about this, and to perceive so is probably a delusion just because we are not a dog or a fly. Whether some animals are conscious in a way similar to humans is a heavy and difficult debate. However, one counter-argument stating that “if animals were intentional agents like us, they would have found a way of communicating with us” is self-centered in the same way that arguments about the special difference of humans are self-centered. Perhaps animals are indeed communicating in some way, but we’re not listening correctly. Why blame the animal? Communication always involves active participation from more than just one party. By analogy, God and his angels have never communicated with me. Does this deny the existence of God? Surely, no, you would say the problem lies with me, not with God. The guilty party here is interchangeable, depending on who needs to be guilty: I’m not listening correctly. Perhaps animals communicate in the same language as God.

The arguments about “difference in kind” between humans and animals are reminiscent of similar arguments made about the difference in kind between some humans and other humans. Generalist Europeans were able to adapt everywhere due to their ingenuity and religious morals, whereas some benighted Australian Aborigines or Africans or American Indians were specialists, confined to their climes and unable to invent the wheel, speak English, or understand the Revelations. Religious morality has always been one of the biggest backers of racial segregation, often in hypocritical

conflict with the equality often alluded to in religious texts. Worse still, women, female humans, were often “known” to be below men in the accepted hierarchy until quite recently, Christianity’s recent emphasis on equality notwithstanding. Aristotle’s contribution to this long, long bluff on the part of men was an essay on how women were actually “deformed” males. Such beliefs in “difference in kind” still persist of course in almost all religions, including the Catholic Church, where women still cannot be ordained for the priesthood, that presumed peak of moral communication remaining an exclusively male domain. Most Christians have, at least publicly, abandoned such beliefs in male superiority because it’s viewed as archaic and embarrassing. Yet, it was “known” for a very long time. Drummed-up hierarchies, categories, and differences-in-kind only seem to say something meaningful about their inventor, usually sitting pretty.

An intense pre-occupation with one’s own senses and self makes one less receptive to understanding the point of view of all others, those less-known entities. Truths probably do exist beyond our own immediate capacity to sense them, and sometimes we must trust others for having sensed something we haven’t. This means we must sometimes allow ourselves to be skeptical about even our own senses or what we thought we knew as true. Such skepticism is indeed an important foundation of modern science, and the results of this form of humility speak for themselves. In thinking that we as scientists believe atoms, molecules, and evolution to be 100% true, our religious friends see our thought processes as mirroring their own desire for certitude. Scientists will find themselves capable of rejecting evolutionary theory if provided with enough convincing proof against it. This may be difficult to fathom for people whose lives are built upon certitudes...that we don’t necessarily think the same way they do. If a certitude-centered worldview prevents one from understanding or even imagining other perspectives, it follows that the flow of ideas central to modern scientific discovery will suffer in such an environment. Because, science is more than just an exclusive club of smart people classifying things in a hobby-like manner. Science is about puzzling together new knowledge and pushing the envelope of truth beyond our personal senses. A good detective solving a crime does not “know” who is guilty right from the beginning and then go through the motions of classifying all the evidence for the sheer beauty of how it all fits with his knowledge. Granted, he may

never be 100% sure that the person he put behind bars is really guilty. However, the system works.

Skepticism often seems to be accompanied by a degree of trust. It is not only a gaping hole where a certitude used to dwell, but rather an opening for communication. That this state-of-mind should be misinterpreted as a deficit of sorts is, once again, more revealing about the certitude-keeper's difficulty in seeing things from a perspective different than their own. Skeptics are not "wavering" between certitudes, but rather, they are assimilating information unencumbered by certain certitudes. For, we are talking about God and religion here, after all, and the skeptics are the non-believers. It often seems to me that a greater faith in God often comes at the expense of faith in humanity. It's as if there's only so much faith allotted per person, like love in a way. Rather than having lost anything, agnostics have gained a greater faith in their fellow humans and a trust in that which can be communicated to them from entities beyond their self. The trust in others which the agnostic feels compelled to give will only enlighten him to new forms of knowledge, not excluding perhaps even the existence of God. In contrast, the devoutly religious, yet chronically pessimistic individual full of contempt for the lack of perfection in the world which sullies God's creation, is perhaps now becoming a rarer species.

Skepticism need not come at the expense of morality. To suggest that a skeptical philosophy, or a lack of faith in God, will lead to immoral behavior is, once again, indicative of the true believer's frame of mind. How fragile it is! Should a certitude, such as the sun orbiting the earth, be refuted, one would hope that human morality would not suffer – unless, of course, people were convinced it would suffer should the certitude be refuted, then all hell breaks loose. No, religion is not the primary source of morality. The primary sources of morality include our mother and father, then our extended family, then our peers. Religion forms a subset of the latter. Of course, one may wonder where it originally came from, this set of rules, since every parent had a mother and a father themselves. I would argue that morality comes largely from cumulative human experiences; the golden rule is not only a religious one but works well in secular contexts. Further, I wouldn't exclude a biological, heritable component. The assertion by some believers that human-kind and animals are separate such that one may perform any number of acts on animals (and nature in general) which would be deemed immoral in

humans does not hold, at least for me. I would never abuse an animal just for no reason and I challenge Tom to exercise his belief that knowledge of a difference in kind permits him to pluck out the eyes out of a newborn kitten. Should he be capable of this, I doubt that his morality would be left intact in the eyes of his peers.

It is not the false beliefs about our nature which make us act immorally. False beliefs, in a skeptical milieu, are innocent and redeemable. Rather, it is routine dishonesty toward ourselves, and consequently toward others, which paves the way to immoral behavior and hell breaking loose. The tendency for keepers of the Faith, from shamans to the popes, to maintain their power through delusion and deceit is not lost on anyone. The current Moral Crisis in the Catholic Church exemplifies this problem all too well: a priest's dishonesty toward his sexual nature can turn him into a child-molester, True Beliefs about God and Nature notwithstanding. And his religious superiors cover it up while God is watching.

2. A trip to the Creation Science museum in Santee

Last Saturday we were stuck in Santee, a community on the desert edges of San Diego, while our Toyota Corolla was being repaired by Moses (our Filipino car repairman). With a couple of hours to kill, we drove around in our other car, looking for things to do and places to eat in the vicinity. On the way towards Lakeside we saw a building labeled “Museum of Creation Research.” I asked Anja to drop me off there after lunch so I could check it out while she returned home for the kids’ naptime.

Feeling a bit like a fraud as I entered the museum lobby and smiled “hello” to an attractive young attendant behind a desk, I immediately proceeded into the museum proper after finding out that the entrance was free. The museum was organized into a sequence of small interconnecting rooms, like a haunted house, where the first seven rooms were devoted to the seven days of Creation. Subsequent rooms focused on aspects of the Creation, such as geology and history. Each exhibit was structured to provide evidence for a “Young Earth Creation (~6000 years old)” and arguments against the prevailing scientific theories were outlined alongside each display.

I found myself completely alone in the museum, relieving me from the distraction of having to interact at some level with other visitors. I had the luxury of being able to fully read every last caption and examine every display without just pretending to do so (because of my even greater interest in the people who might want to spend a Saturday afternoon here). The displays started with some astronomy (Day 1) and proceeded with plants and animals, complete with live creatures in aquariums and terrariums. A large model of a cell explained some developmental biology, and the metamorphosis of a monarch butterfly was shown in pictures. Following the 7-Day preliminaries, I entered a perplexing chamber featuring a soundtrack of wailing babies – very distracting if you’re a parent conditioned to the sound. Broken laboratory hardware was displayed along with various unrelated dusty paraphernalia. I proceeded from this purgatory of despair, this transition, into Noah’s Ark. A small model of the Ark was featured here, looking a bit like a wooden supertanker, along with extensive details on its construction, buoyancy, and on how Noah managed to house over 100,000 animals on this boat. On one wall of the wooden chamber was a realistically done painting looking like a perspective down the

inside of the Ark, with all the animal pens (an ostrich looking over the wall into a stegosaurus pen) and Noah on a gangway. From the Ark, I walked into some geology discussing the Grand Canyon and Mount St. Helens, then an Ice-Age complete with howling wind, then some rooms discussing Neanderthals and other hominids, then rooms featuring emerging human civilizations, then some concluding comparisons between evolution and creation, climaxed at the end for some reason with George Washington Carver, the African American peanut scientist who was also a Christian.

Taken superficially, as described above, the museum seems an innocent mish-mash of various subjects – biology, geology, history – with some amusing side-shows such as the supertanker Ark and its detailed menagerie. It's only when reading the display captions, however, that I grasped the depths of delusion peculiar to the curators of this museum and its supporters. Most displays, from descriptions of the planets to the Ancient Egyptians, were accompanied by text in the form of Biblical quotations and arguments for recent Creation. Not being well versed in appreciating the Holy Book, I was left uninspired by Biblical quotations used as proof of something. How does the book of Job saying "...the Snows melted" constitute evidence for an Ice-Age? So I quickly started skipping most of the Biblical evidence (immediately recognizable by colons, quotation marks, and italics) and focused instead on the bold-type, bulleted arguments on why the world was created about 6000 years ago, ready-to-go with mature plants and animals, old rocks, and all.

One recurrent argument was most fascinating. For subjects ranging from the Big Bang to plate tectonics to evolution, the museum stresses that even scientists acknowledge these to be "just theories," whereas creationists *know their explanation to be the truth*. Consequently, the theories, which can't be proven 100%, don't match in value to truth, which is by definition true. This mental short-cut makes you wonder why these creationists even bother to trying to prove anything. The supremacy of "truth" over theory puts into question the whole creation research endeavor. Why use science to try to prove the existence of Noah's Ark if just knowing it existed is more valuable? These creationists must have a nagging feeling that scientific theories actually stack up quite well in value to un-researched "truth." They want to be respected like scientists, but already know what they will find. Somehow that recurrent blunder foreshadows a

disingenuous approach to subsequent details and fact-gathering. Sure enough, here are some examples:

Isotope-dating methods are inaccurate. Even though isotope-dating methods indicate rocks and fossils to be older than 6000 years, the *rate* of isotope decay may not be constant. A very fast deterioration of carbon-14 during the tumultuous flood would make objects appear older than they really are based on today's observed rates of decay.

Neanderthals, Homo erectus, and cro-magnon are just evidence of the large genetic diversity in mankind following Creation. Also, the Neanderthals may have been very old individuals, like Methuselah and other long-lived Biblical characters, since some of their features and morphology (stooping, thick skulled, ragged) resembles that of old people today.

Noah was able to manage over 100,000 animals in one boat because most of these were in a state of hibernation following the effects of stress caused by the flood.

Science has not found any evidence of life on other planets, thus proving the special creation reserved for Earth.

The Grand Canyon was not eroded through millions of years but rather was formed quickly, much like the altered landscape of Mt. St. Helens following its eruption.

The list goes on, and the arguments for a recent creation are sometimes creative, somewhat reminiscent of explanations from my 4-year-old daughter in their opportunism and innocence. Yet, the intentions of this museum and the Society for Creation Research are not innocent. The final hallway before the exit, the museums parting thought, makes this all too clear. A tree of Creation is contrasted with a tree of evolution. The tree of Creation is leafy and supports love, hope, equality, and about 20 other good things. The tree of evolution is dead and supports atheism, pornography, racism, hatred and every bad thing imaginable. On that note I wandered back into the lobby, out the door, passed a

family with young children entering, and walked back along the side of the road, back to the garage to get my car, thinking about Truth and Creationists. Moses never did find what was wrong with the Corolla, so he tweaked something to make it pass the smog test.

3. My second letter to Tom, undelivered.

All religions, like architecture, were built upon foundations already tested to be sound for a particular society. In the case of Christianity, these foundations may have less to do with a Supreme Being and more to do with women. In the following paragraphs, I will outline some ideas on the evolution of Christianity and its effect on Western civilization.

Christianity represents to me the feminization of human societies, which is a good thing. The primitive human standard is a male-dominated society where women are not viewed as equals and are treated as chattel or slaves. There is ample evidence for this in the anthropological literature, and it is likely that such inequality was widespread in the region where Christianity was born, the Middle East. In the primitive human standard, the woman is not necessarily beaten into submission, but she does somehow agree to perform most of the labor: she gathers wood or dung for fuel, she hauls water, she tends most of the “lesser” crops and livestock, she cooks, cleans, produces and raises children, and then takes care of the elders. She submits to all of this most often willingly, for the good of the tribe, and does not question anymore her role in society. She doesn’t dare to assume a work or leadership role on par with men. A girl growing up in such a society may start out, as a child, with equal ambitions as a boy, but she is quickly boxed down by the stronger sex (and by her older female relatives) to comply with the old cultural traditions of inequality. Soon enough, the girl bears children and the cycle continues. The system obviously works and such symbiosis is not necessarily all that bad. Yet, it works largely because of the woman’s choice to “turn the other cheek” and find strength through submission.

Picture a little girl growing up in a primitive human society. How can she not sometimes see her male cohorts as “enemies?” In early childhood they play together, but soon enough, they shut her out from much that may be of interest to her (hunting, traditional male crafts, abstract ideas and magic). They ham up their hostility in public, shattering old childhood friendships for the sake of new male bonds. Males bark orders at her and do not even speak to her directly anymore, as if she isn’t worth a glance. Eventually, the male mafia often decides who will be her mate, they may trade her down

the road, and if she resists to these cultural traditions, she may then finally be given a good beating or be ostracized in some humiliating way. Meanwhile, she hasn't stopped cleaning, hoeing, suckling, hauling, caring, and probably doing quite a bit of crying in her younger years. Yet, through all of this, the emerging woman finds it within her heart to love the man she's with, to love the family she has created with him. She loves and cares for the enemy of her pre-pubescent days, before she was swayed. Her enemy may turn out to be a sheep in wolf's clothing, in which case her oppression is only a public façade. On the other hand, he may be a true bear and make her life miserable. In either case, she decided to, amazingly, "turn the other cheek." Violence may not define most current male-female relations, but the primitive human standard seems to have weighed more heavily on the violent side (starting with female infanticide). Why did women put up with this violence, all this posturing, orchestrated by men? Perhaps because they loved men, and eventually, because they loved their children, half of which tend to be males.

To "love one's enemy" and "turn the other cheek" are not novel concepts coinciding with the birth of Christianity. These are advantageous strategies, practiced routinely in all societies by perhaps half the population. To love an entity beyond yourself is a big step in consciousness; when applied to someone intent on dominating you, it's a veritable leap. Love is constructive rather than destructive. It is progressive because it is optimistic and trusting. But, on another level, love is a form of power. It confuses the hell out of your enemy (or mate) when you love him even though you have compelling reasons not to. He imagines you to have access to so much unseen power that you can afford to do this, while he's scrambling to construct and maintain an aura of terror and strength. So much human (and other animal) behavior involves posturing, feints, aggressive displays, fights, territory: Alpha males are stressed and worn out by the time they claim that exalted, short-lived, position. But, to bypass all the posturing, all the mutual hypocrisy, by simply expressing love – even to your enemy? It's disarming. Women (and certain peripheral males) have known this for a long time. Still, it is not surprising that such a powerful idea remained confined to mostly women. It required a woman to spread the faith beyond the family niche, and men are the traditional faith-keepers and will not naturally follow female leaders in matters of the spirit once they outgrow their mothers. Any self-respecting movement required a man at the helm. A Catch-22 situation.

Enter Jesus, a feminized male. Is it possible that Jesus, the progenitor of the religion we call Christianity, was a homosexual – a true (genetic, neurological) homosexual, the such as have probably always existed in human society? Although it remains possible that his sexual dissociation from women was achieved post-facto by Christians attempting to sanitize his life, in the New Testament Jesus never marries or procreates, he surrounds himself with a group of devoted, jealous males, and he is anachronistically battling with his conscience until his masochistic death. This last point, being true to one's conscience, that internal truth, was to prove to be a cornerstone of the new religion. Yet, this strange concept might occur more naturally to a closeted homosexual whose inner self is at odds with society's expectations. Jesus did not live in a gay-friendly society. Perhaps his practical inability to “come out of the closet” fueled his understanding of conscience: dragging the mind out into the open, while it had always been kept jealously guarded and secret, would seem natural in a man tortured by his love of men. Conscience is of course also accessible to heterosexuals as well, but without the daily battle that must rage in closeted homosexuals.

The religious sect which evolved into Christianity was novel in that men practiced behaviorisms typical of women. This had never been successfully attempted in Western society, although the benefits – love, conscience, nonviolence – were obvious. It was just that non-males were never in a position to influence and lead society beyond the crucial family niche. Now, a group of men, with a charismatic leader, were successfully behaving like women. For a society reared by women (we all have mothers), the concepts probably evoked a feeling of security and satisfaction, something more evolved than the primitive human standard based on male strength and deception. With the crucial ingredient of God thrown in, this proved a recipe for success: a marriage of the traditional personification of the Self with conscience finally dethroned all those wooden idols and invisible spirits.

The feminization of society seems a likely emergent property in the evolution of human consciousness, and Christianity may therefore have been one important catalyst toward this trend. An emphasis on empathy and conscience is so clearly beneficial to the survival and progress of a society, just as empathy is crucial for the well-being of demanding human newborns and children. Women are by nature better able to empathize

with others because they bear children and are their primary caregivers. Women are thus forced into a different understanding of human relationships than men are. They are forced by nature to see beyond their own self, to put themselves in someone else's skin, to feel another person's pain, happiness, anger, in a way which men may never experience. It is precisely this kind of intelligence, this "theory of mind," which creates cohesiveness in society and which is conducive to the honest sharing of ideas which leads to progress. Christianity allowed a women's special consciousness to grow beyond its traditional niche, the family circle. And, the fitness associated with such intelligence now was able to benefit a society in general, namely, Western Civilization. The spread of democracy and human rights, as well as the scientific method towards acquiring knowledge, all flourished in Western society. However, these beneficial approaches did not catch on quickly; they only flourished after about a thousand year incubation, during which the Christian power structure did indeed revere the concepts of love, empathy, and conscience, but only in the form of the usual bloody idolatry people were accustomed to. For roughly a thousand years, the Roman Empire, now transformed into a Christian empire, continued preoccupy itself with holding on to power by the same primitive human standards typical of male behavior. During this thousand year intermezzo (the Dark Ages), the potential encouraged by Jesus did not catch because the new religion was hijacked by the same old pagan powermongers who had always quenched any change: male shamans and their descendants – priests, cardinals, bishops, popes – all still good old boy clubs intent on holding on to power, even if it has to be clothed in love and empathy. While preaching empathy, while making people look at their conscience and confess their sins, while glorifying poverty, suffering, and the bloodied Jesus, the Roman Church amassed the greatest wealth ever, the greatest power structure ever, via the greatest organized hypocrisy ever. This colossal mistake only began to be overturned following the Reformation in Northern Europe, where, notably, societies were traditionally more tolerant towards women. But, the main catalyst for getting Western Civilization back on track with Jesus' original ideas did not originate in the hallowed halls of a church or seminary. Rather, change was inevitable following the sudden desire for Europeans to escape Europe and explore and colonize other parts of the World. The Dark Ages were ended by adventurers. They jolted the status quo.

The first taste of adventure came with the Crusades. A number of crusaders certainly were motivated entirely by religious zeal, the quest to restore the birthplace of Christianity to Christians. But the vast majority were probably young men looking for adventure, for exoticism, for a change from the dreary monotony of peasant life in Europe. Religion has always provided a smokescreen, an excuse, for more basic male interests such as control, combat, pillage, or heroism. The Crusades, unsuccessful as they were, offered a form of freedom for tens of thousands of men, and those who made it back to Europe also brought back new tastes and ideas. Many stayed behind and became “colonials” of sorts. In any case, the notion slowly emerged that one can get away from Europe and its controlled power structure.

The first great escapes and explorations occurred in the 15th century, only a few generations after the last Crusades. To get to Asian markets without having to deal with the infernal Arab middlemen, the Portuguese circumnavigated Africa, then the Spaniards discovered America, and eventually most Western European nations were engaged in a world-scale effort of exploration, trade, and colonization. As for the Crusades, Religion provided a suitable cover for more basic interests such as trade or adventure. One must distinguish the desires and interests of the religious hierarchy existing in Europe with the interests of the men who actually manned the ships and built the colonies. Crews were made up of an amalgam of European types, with, for example, Flemish men from the Spanish Netherlands often providing manpower alongside Basques, Bretons, and Spaniards. These were adventurous men, used to the perils of the sea, not choir-boys. Religion was often represented on these expeditions by a Friar. The Friar, along with keeping the faith, was also often entrusted with writing an account of the trip. This would be analogous, in perspective, to sending a priest along with a lunar mission. Accounts written by Friars of course emphasized the religious aspect of the undertaking; that’s what Friars knew, they didn’t concern themselves with (or do) much else. A clearer picture emerges when the few literate others (why were the religious ages so illiterate?) wrote, such as Francisco de Orellana: the Friar was often viewed as a genuine pain in the ass, often seen as unreasonable, as a parasite spouting hypocrisies irrelevant to the current very challenging situations. Imagine a priest on a lunar mission, occupying a fourth seat in the cramped spaceship, telling Niel Armstrong what to do, berating him

regularly, glorifying God when Mr Armstrong lands the lunar module in the nick of time, never doing a stitch of work, and then being allowed to write the official account of the moon trip. It's positively infuriating. Certainly some found comfort in the presence of a representative of the Faith. Most of the rest, Catalans, Basques, Dutchmen, and other adventurous Europeans comprising the crews, saw the Friar for what he truly was: distinct from God, a hanger-on, a political agent, a middleman. These were just representatives of the Church, not a driving force in what evolved to be the Age of Exploration, the precursor to our current age of science.

The Church has often claimed credit for our civilization as we know it today. Yet, as outlined above, key aspects of Western civilization may have resulted more from a secular sequence of events. Typical female concepts were transplanted successfully to males. Combined with the young human's natural instinct for exploration and adventure, one can start to see the roots of the scientific world we live in today. The optimism and intelligence of empathy, the ability to see things from a perspective different than your own, are just as crucial to science as the desire to explore and discover. Put together, empathy and curiosity are a powerful combination which found fertile ground in the Western World. This happened despite the religious establishment, which is by definition intolerant and unwilling to accept another's perspective since its power relies on "certitudes." Individuals can be tolerant, societies can be tolerant, but most religions promote intolerance. Fertile ground for change was found in the Western World despite monumental intolerance and inertia from the Roman Church because the Western World suddenly became much larger. The wealth and opportunities created by the opening up of the Americas and other parts of the world to adventurers, settlers, and trade caused a re-evaluation of Europe's relationship with the Roman Church, those vestiges of the Roman Empire. Newly wealthy Northern European societies created their own brand of Christianity, keeping the central (feminine) concepts voiced by Jesus, without all the paraphernalia which had muted these concepts for over a thousand years. By eliminating the old clutter, Protestantism allowed the benefits of a combined female/male mentality – empathy/adventure – to fulfill its potential in society. It is perhaps not chance alone that has made just about every Protestant Christian society more advanced (in terms of

mortality rates, wealth, and individual freedoms) than any Christian society dominated by the old Roman Church.

But, to fulfill the human potential represented by such a male/female balance, one does not need religion per se. Christianity, like all other religions, will not outlast the evolution of human consciousness. Humanity is likely to keep evolving, both culturally and genetically. The evolution represented by feminization has had evident selective advantages. Religion may have just been a vehicle for the spread of such change. And, like the vehicles of our age, they may end up (not without affection and regret) in the dump. Meanwhile, humanity lives on, explores, loves, and can still believe in themselves and God.