

## The Graduate Student Blues

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# The Graduate Student Blues

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## Synopsis

This is a memoir about my rather unconventional path to a mathematics Ph.D. There were difficulties, due partly to university politics, partly to my youth and immaturity, and partly to the thesis material itself—it was, in the words of some of my fellow students, “not what’s being done now”. I had written the thesis entirely on my own, without help from my Master’s thesis advisor or any other professor at my school. This is not the usual procedure of course. Nobody in my department could understand the thesis or was willing to vouch for it. There followed three years of suffering, self-doubt, anger, vulnerability—and determination. The memoir also explores the connections among love for math, career in math, academia itself, and investment in other passions of life.

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## 1. Feeling Weird

In 1966, age 23, I was longing to create something—anything. But my most recent and important creation seemed to be headed the way of the non-created, and this was sending my muse on strike. It was a math thing, not a writing thing—my completed Ph.D. dissertation-wannabe, all dressed up and nowhere to go. *Pseudo Order-Type Maps*. An abstract algebra idea of my own invention and/or discovery. Invented, discovered—and advisor-less. “I don’t believe I’m qualified,” everybody in my department was telling me.

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I'd done what I'd always done with math, since catching the math bug back in ninth grade algebra. I'd always had my own ideas, bouncing off things I learned. I'd explored these ideas to my mind's content, regardless of whether they'd affect my grades or impress my teachers. I couldn't imagine any other way to do math. My high school and college explorations probably weren't Ph.D. material but *Pseudo Order-Type Maps* possibly was. It was, after all, an offshoot of my master's thesis, which contained an original theorem about "the order of a distribution at a point". I proved a structure theorem, one of my favorite types of theorems, about which real functions could be expressed as the order of some distribution at the various real points; the theorem said that a necessary and sufficient condition was that the function be upper-semi-continuous. This thesis had quickly been approved by an advisor from my department and gotten me my master's degree.

But now— due to political stuff going on within the department, stuff I didn't understand, mostly because I wasn't told — this advisor had left the school. He'd found a new position in New York City, which was precisely where I'd soon be living because my husband Jeff was about to begin a two-year physics stint at the Institute for Space Studies. I could have transferred to this advisor's new place, especially if he backed me up with recommendations. But he wasn't offering and I was afraid to ask.

Now, over forty-five years later, I understand: he was newly hired. He might not have wanted to take a chance by bringing in a new student, might not have wanted to risk upsetting his apple cart. Yes, now I get it. I get a lot of things now.

Not only does the creator, ideally, bring beauty and joy to those around her; she brings beauty and joy to herself. She thrives on her creativity, is addicted to it, for many reasons, some healthy, some unhealthy. Having been robbed of it, I felt lost. Things felt weird.

Wandering through a museum I had wondered, after all these years does Picasso still love to paint? I meant the way he once did? Or is he just doing what's expected of him, what he's famous for? An artist does what she does in order to express what she thinks or feels. But does there ever come a time when she forgets what she has thought or felt but still goes on? And it no longer comes from within? My doubts about the fate of my math brought questions like these to the forefront. Silly questions seemed vital.

## 2. The Frightened Animal

When I was fourteen, in my first ecstasies over math, I had a dream which still burns close. The dream's protagonist was a young woman named Pamela, who lived during the 1600s. I watched her as though it were a movie. "There has been only one woman genius," said the dream narrator, "but she was the greatest of all the geniuses.

And what had Pamela done? Not much in quantity but extraordinarily much in quality, relevance, and emotional intelligence. She had, first, made a statue of a tiny animal looking up at a plant shaped like a huge spiral. "Pamela fashioned the animal frightened," said the narrator. Second, Pamela had put labels on all her belongings. "This is my whatever." I supposed, when I woke up and now too, that what Pamela had done was to never ever forget, to carry it around with her always—it being what she knew, it maybe being math. And indeed, the narrator concluded, "It is not clear what Pamela was but it is speculated that she was a mathematician."

That last reminded me of a sentence from *Moby Dick*. "His greatness was in doing nothing to prove it." I wished I didn't have to prove my greatness. I wished I could not bother with the Ph.D. and people would still know I was great, or at least adequate.

## 3. Student Too Long

On the bus one afternoon I suddenly thought of things to write. Like, how weird it was that some objects (like me) were attached to brains while others (like vases) weren't. I'd look, first, at my toes, then my knees, all the way up to my chest, as close to my head as I could. It gave me the feeling that I had this dead weight emanating from my head, a weight I could never get rid of.

What I liked most about writing was looking over what I'd written. Similar with sewing clothes and wall-hangings. But math was different. Math I loved everything about. Not only the finished product but also the unfinished product. Every equation, every proof. I loved math as much as when I'd first discovered it. But that love was being threatened. Too many negative associations.

Some of my classmates said I was doing things that “aren’t being done now”, “have nothing to do with anything”, “aren’t current”. “So what?” I told my husband Jeff. “Pure math is pure math”. But my young ego was hurting. I’d been a bad girl, had ignored the experts, had done something inexcusably wrong, not only as a mathematician but as a human being. It made me angry, feeling so guilty when I was not guilty. Even if I had done something wrong, it wasn’t that wrong. I wanted to believe that in my gut. I was missing perspective, and it seemed the powers that be were missing it even more.

Probably I’d simply been a student too long. I was tired of being a thinking woman. And tired of faculty parties. Tired of faculty wives who had Ph.D.’s and tired of faculty wives who didn’t have Ph.D.’s because they didn’t believe in Ph.D.’s. Tired of women with thick accents, talking about how the universities in Europe differed from those “in the States”. Tired of women who were so anxious to show they weren’t the type to be “tied down by children” that, so I then perceived, they sacrificed their own children, or maybe only themselves as mothers. In short, I was tired of academia. Especially since I was on the lower rungs.

#### **4. Tired, Period**

I’d dished out, so I felt, too much creativity in my twenty-three, -four, and now -five years. I was afraid I wouldn’t be able to keep it up. I wanted to relax, do nothing but shop. Shop and sleep. Shop and live. I sort of wished I could have a nervous breakdown.

But I knew I wouldn’t. Other students were in even worse shape. Most weren’t getting any work done at all, didn’t love math as much as when they’d first discovered it, or hadn’t ever really loved math. Still, I was probably angrier than these others. Angry because I didn’t believe I should be sacrificing my happiness for science, even pure math. It particularly bothered me that one of the reasons I was working this hard was so I would be allowed to finish up the Ph.D. and have a baby. But women who didn’t even have bachelor’s or high-school degrees were allowed to have babies. It seemed unfair. More was being expected of me than of other women.

Yes, sick and tired of academic people. The men all either wore suits or made a big deal about not wearing suits. They made fun of the ordinary pleasures

of life—TV, fancy weddings. But it seemed they did so longingly. They did many interesting if typical things—paint, hike, visit museums—but did they really enjoy them? In political discussions their attitude seemed to be “Well, of course we’re liberal and intelligent enough to know. . .” Of course they were all against the Vietnam War and of course they believed in civil rights. It seemed they were trying to be something, perhaps something they actually were but didn’t quite know what that something was.

## **5. Something I Couldn’t Handle**

Academic people had their own lingo. Phrases like “ahah” and “or some such thing”. And they felt they had to get their own subject (math for me, physics for Jeff) into any conversation, as a joke. And the jokes didn’t seem particularly clever, or enjoyable. When we got home from faculty parties, Jeff and I would make fun of it all.

One day Jeff, I, and one of his physicist friends went to one of those movies on 42nd Street. Academic people would never admit they wanted to go to a porno so Jeff and I would do their admitting for them. But they’d still feel a tad guilty so they’d need to make fun of the whole thing, acting as though they were slumming. In this case the physicist friend kept saying things like “nude field equations?” and “Einstein gone erotic?” But I squelched it all by answering, “Nope! Just plain unadulterated sex!”

When academic people sat down to lunch, so I surmised, it wasn’t like they have it in movies. That is, it wasn’t that bad. They weren’t all dignified and businesslike. But, whether or not wearing suits, they reminded me of businessmen. They’d laugh—sometimes even a hearty belly laugh—but not for long. The laughter never went on and on. The same with conversation. Both ended, after maybe five minutes, with everyone staring self-consciously at their plates, rattling their cups, toying with their spoons, lighting pipes. They’d sort of nod and half-smile, as if pondering what was just said. Sometimes one of them would smile extra-hard and murmur “yeah. . .” and they’d all start laughing again, but spasmodically and half as loud. Conversation didn’t just flow. It spurted.

I wasn’t shy like in high school. I was even beginning to border on extrovert. I didn’t feel uncomfortable talking with strangers and I was good at carrying on conversations. I sometimes even found myself the center of attention in

small crowds. I could give sure-fire tips on cooking, shopping, and sewing, and Jeff and I had a gorgeous apartment, so people said, that we'd furnished relatively cheaply. I was also the best at doing the twist. In certain respects I was more daring than most people. Salespeople couldn't make me feel self-conscious. I refused to let traveling salesmen in our door. I didn't get very nervous before interviews.

But now I'd hit something I couldn't handle. I didn't have the nerve to talk to all those big-deal professors and maneuver a Ph.D. for myself. I felt as though the powers that be were taking advantage of me and I didn't know what to do about it.

## 6. Yes He Did

Should my master's degree have been a Ph.D? It was, after all, original work, maybe publishable. Jeff seemed to think I should have stalled in writing it up, in order to get a Ph.D. out of it, the way, so he perceived, another student had. He'd found a counterexample to somebody's conjecture and procrastinated for another year. It was okay to get a Ph.D. in three years, but not in two (as I would have). That was Jeff's take on it. I wasn't sure. I didn't think my Master's thesis was Ph.D. material. Jeff and I didn't actually quarrel, but as time went on, things he said heightened my feelings of guilt and confusion.

My master's advisor had told me I could pursue my research along the same lines, towards getting a Ph.D. But instead of plugging away with distributions, I began to abstract the idea. It developed into a whole new field, the above-mentioned *pseudo order-type maps*. I studied maps—functions—from arbitrary vector spaces to lattices. The maps had certain properties, such as the function value of any sum is not greater than the maximum of the individual function values. So then that advisor had said I'd proven a lot of theorems and while they weren't yet enough for a Ph.D., I should feel encouraged and keep working. In a few months I'd probably have enough results. Every time I saw him he repeated what he'd told me.

YES HE DID, YES HE DID, YES HE DID. I kept reminding myself of that when things began to sour. There was always the chance that I was remembering incorrectly, maybe I was even crazy. I couldn't prove that was what he said. I hadn't made a recording. I wished I had.

## 7. So How Come?

Why must human beings make existing so difficult for one another? I wrote in my diary. Answer: because of ambition. Whenever we succeed-bigtime, we want to keep on succeeding-bigtime. We're addicted to it, like I was addicted to creativity. And in order to succeed-bigtime we must have something to succeed-bigtime against. So we court pressure and competition. We want the world set up the way it is because if it weren't, everyone would be judged the same and a lot of people have grown to feel confident that they would then lose out. They all feel above average and they want to keep feeling above average.

So how come I didn't feel that way? How come I didn't have any burning desire to succeed-bigtime, to be above average? All I wanted was to be safe. Why couldn't I stay home and be a housewife and have children? Why, just because I loved math, did I have to be an academic? Why did I have to know about women's liberation? I was afraid I wouldn't have the ability and strength to make use of it.

And I was afraid I wouldn't come up with enough "results" worthy of a Ph.D. Why couldn't he just say "theorems"? I was so very tired and a little afraid of that word "results".

## 8. Results

No, I wasn't shy. But I also wasn't quite socially mature, certainly wasn't savvy. I could have pinned him down a little. Asked him whether I should apply to his new school. Asked him who would be my advisor now.

The chair had said he'd try to get me an advisor at another school, since nobody at this school felt qualified to judge my work. "Who knows?" he added. "Perhaps we can get the man himself, Laurent Schwartz." Yes, the originator of distribution theory, which had inspired my thesis ideas. He was joking, or fantasizing. At any rate things seemed, if not great, then at least somewhat settled.

In the meantime, I went to see a friend of mine on the faculty. I told him exactly what my situation was. He felt bad about it and tried to be helpful. He suggested several "people", as he put it. That word too I hated, when it meant "mathematicians" or "advisors". I hated even more the word "men",

when used that same way. But he offered to listen to my thesis ideas. Every morning I spent an hour “lecturing” to him on the math I had created, or invented, or discovered. I enjoyed those sessions, they set my brain in motion, I proved a few more theorems, realized others were wrong, and got the whole theory better organized. I thought this might lead to him becoming my advisor. I would have loved that; he was so pleasant.

However, such was not to be. I was to suffer a lot more. Part of me refused to suffer more. But saying no doesn’t always work. Neither does being savvy. For indeed, I did ask this pleasant and helpful person, point-black, whether he would consider being my advisor, and he answered that he would if he could but his relations with the department wouldn’t permit it, I would be caught up in that politics.

I didn’t give up. Could I talk to the chair myself? I asked my hoped-for advisor. Sure. So I did. Or rather, somehow the chair himself beat me to the punch, mentioned that he’d noticed I’d been meeting with someone. But I was suspicious, and correctly so. My chosen advisor told me that, in effect, he planned to declare out-and-out war with the department and with the rest of the administration and that, unless things went unexpectedly smoothly, I had better steer clear of him as an advisor. He would help me in any other way he could.

A few weeks later he’d had his “out-and-out war” and he reported to me what had happened. Things hadn’t gone very well, he was accepting a position elsewhere for the following year. The chair had also expressed annoyance at “Mrs. Cohen’s” tendency to not “work with the department”. Well, true, I hadn’t done what other Ph.D. candidates did; I hadn’t asked the authorities to suggest a problem for me to work on. I’d thought suggesting a problem myself was doing one better. Oh well.

The chair did do something, though, in an effort to be helpful. He’d “found” and hired a new Ph.D. working in Schwartz distribution theory—“a woman”, he added proudly—and had spoken to her about me. But when I showed her my potential thesis, she said things like “what you’re doing doesn’t tie in with what other mathematicians are doing” and “I have a feeling that it isn’t going to lead anywhere”. After she said that last one, she handed me a box of tissues from across the table.

## 9. Scared and Cold

Oi, the tragedies of graduate students! I can laugh and smirk now. But at the time my spirit felt broken. I showed her less and less of my work, and my math ideas came fewer and farther between. I decided to stop trying. My love for math, I felt, was too frail a thing to be subjected to what it was being subjected to, so I would quit. Perhaps only temporarily.

Jeff wasn't happy with this decision. And I missed math. I also wondered what my future would be. Mostly, though, I still had to go to one required class a week. How I dreaded Mondays! I felt an uneasiness about my school that bordered on fear. It was fear. The fear crept up every weekend. It was almost an instinct. My stomach, come Saturday, automatically felt heavier. I was moody. I avoided being with people other than Jeff. All I wanted to do was sit on the couch and look at our tremendous view from the sixteenth floor of our building on Riverside Drive—quiet things, things not in motion.

Sunday nights I couldn't sleep. I knew that the minute I dropped off, the next thing would be six o'clock, alarm blasting. When that actually happened, I felt the same way I used to feel when I was little and dressing for school in the mornings — scared and cold. And sort of bewildered, as though I hadn't the faintest idea why I was bothering to go through these motions. I could have called in sick at least one Monday; Jeff offered to make the call for me. But I was afraid – stupidly, illogically afraid. I felt so low and ashamed.

I was reflecting more and more bitterly on society. Like how, in elementary school they punish you for being late to school, saying that in grown-up life people aren't going to tolerate lateness. How they're kind of lying to the kids, how bosses don't always punish you for being five minutes late. And like how I didn't believe "you can't live in a dream world", "you have to keep up with the times", or even "people need other people". I hated all those clichés, more than I usually did and do. And I thoroughly disapproved of how so many academic couples postpone marriage and live apart for four years, in order to finish college. I'd do those things for a Cause, but not for a career. It felt so lonely.

## 10. Slightly Hysterical

At one point I got a little desperate, perhaps hysterical. I had applied for a position at Brooklyn College. In those days you didn't necessarily have to

have a Ph.D. in order to get an academic position. It seemed to me that the only good thing that had happened all year was getting called for that interview. And the interview had gone well. But in the end they didn't hire me. We had picked up the rejection letter at 2:00 AM.

I wasn't used to rejection letters. I wasn't a serious writer then so no rejections on that score. Mostly, what I knew were acceptance letters for scholarships and fellowships. Now, of course, I'm much more seasoned; I don't take rejections as a personal insult, even if they sometimes do hurt, and I certainly don't rant the way I did then. I don't scream, "I KNOW I'm a good mathematician! I know it! I don't have a Ph.D. but that's not my fault. How DARE they tell me I'm not good enough? How dare they..."

I wanted so badly to call up the Brooklyn College interview people. But I'd have to wait til 9:00 the next morning. And yes, I did make that phone call. What did I have to lose? "I applied for a position," I told the secretary, "and I was rejected and I'd like to know why. I won't give him any trouble but I would like to talk with him."

"I see," she said kindly. "Well, he'll be busy Thursday and Friday..."

"I can't come in Thursday or Friday, anyway. Could I see him...?"

"How about Monday?"

"I'd prefer it sooner." I actually said that. But I don't cringe. It was so long ago.

"Well," she answered, "he has a very busy schedule tomorrow. I'd really rather you wait til Monday."

"I'd rather not." I actually said that too. "I'M a busy person too—and an important one." Yep, that too. I should definitely cringe. But she did give me an appointment for 10:00 the next morning. And I realize now, as I didn't then, how nice some people are.

In order to not be nervous about that appointment, I spent the afternoon phoning the main office of the public day care centers of New York City. I had decided to try to get a job at one of them. These children were "beautiful", my friend Clare had told me, and I was interested in meeting them. Everyone in the day care office was very nice, and I got the job, but in those days, I was feeling so hurt and sensitive by how my fellow mathematicians were

treating me that no matter what, I was reminded of all the power other people had that I didn't. Still, I considered doing the day care thing permanently, keeping math as a serious hobby.

The Brooklyn College chair was also very nice—perhaps disarmingly so. I'd planned to be angry but instead I began, "I just thought I'd feel better if I talked with you." That I don't cringe at. He insisted that I was indeed very qualified, very high on the list; the decision had been very difficult. He also told me that the two people they'd hired didn't have Ph.D.'s. It might have been my lack of teaching experience more than anything else, since I'd had what's known as a "research assistantship", no teaching. The guy advised me not to despair, I would get a Ph.D., and I'd find a position somewhere else. When I walked out, I felt foolish, as I'd been afraid I would. But I also did "feel better".

I say I was giving up on a math career but, thinking of all the things I did, I guess I wasn't. I'd applied for math professorships, sent in three papers, one of which eventually got published. I also contacted, as possible advisors, a couple of my old undergrad professors at NYU. I even tried another professor at my present school. But they all said they didn't feel qualified to judge my thesis.

When I went to that Monday class, and hated it so much, I realized, or felt as though I realized, that all the classes, to some extent, had been that way. Everyone acting so false, talking so fast, using words like "results", afraid to ask questions, or asking a question once and, even if not understanding the answer, not asking again. What happened to loving math? I thought. Even if I wasn't good in math, I still wanted to do it. I had the right to do it. But not here. And not now.

## **11. Day Job**

"You have a Master's in math and you're working in a day care center?"  
"So, this is it? This is what you're going to be doing?" That was another thing I was up against. That, and people thinking I was doing day care just to escape. Well, I kind of was, but I had a hold on it. I knew that was the best thing for me, at that time if not forever. Even though the fact of my master's degree raised my salary by only 29 cents per hour.

I wasn't the only math grad student at my school whose thesis nobody in the department felt qualified to judge. Another student—I'll call him Steve—was also forced to turn to an outside school for an advisor. So Steve contacted the author of a paper he was interested in, a guy at Columbia, and that person agreed to be Steve's advisor. Steve then consulted with the chair about it and the chair said okay but first, he said, he wanted to see a list of the guy's publications.

What right, Jeff fumed, has this chair to screen prospective advisors from other schools (especially Columbia) when there were no advisors at his school? Can beggars be choosers? Jeff said the Columbia guy would probably get insulted and say "Ah, just forget it". And where would Steve be? Same place I was.

One day Jeff and I took a walk in Riverside Park. I wound up playing with the children on the swings, while Jeff wound up playing basketball on the jungle gym. It did both our hearts good. Time passed so quickly. Those kids were so cute, even the ones not attractive in the conventional sense. It was great to discover anew every minute that kids of all shapes, sizes, colors, and economic backgrounds are still kids. It was also great practice for the day care job; I wouldn't be very nervous on my first day. I decided that, from then on, I was going to go out to Riverside Park every day and push the kids on the swings. I felt much more adequate and at peace than I had before playing with those kids.

I heard all sorts of stories, probably true, about the childishness of some college professors. A professor acquaintance of Jeff's told us that when he was a graduate student, they gave him a really grueling preliminary exam, during which he was made to feel as though he were stupid, and which he passed. About a week later they told him that the whole exam had in fact been merely a formality—he and everyone else would have passed, no matter how poorly they did—and he shouldn't tell the other students. Our acquaintance said that his first reaction was anger, but then he had decided that since they had done it to him, he might as well do it to someone else, and he joined the little conspiracy. What, I wondered, if one of the other students was his wife? Also, what if a student, while taking the exam, had a fatal heart attack from the stress? Or committed suicide?

In contrast to that crap, the kids at the day care center turned out to be absolutely ethereal. I think now, decades later, of Kara, roundest face and

brownish black hair. Her father, apparently, was a very beautiful person; he seemed to talk in poetry and Kara told me some of his talk. I wish I could remember even part of it, but I do remember Kara saying, "And you know, he says things like that". And the little girl who, though she was five, didn't talk; we didn't know why. But she did everything else and got along perfectly with the other kids. When she wanted something, she'd patiently wave her arms and utter scribble-scrabble sounds. The teachers had no idea what she was trying to say but the other kids would tell us, "Oh, she wants another sandwich". Go figure. Last example: I drew a portrait of one little boy and colored it brown. All the other children laughed, thinking that was silly, but the little boy said, "Well, I AM brown". Then he said to me: "Oh, that picture came out so good. It really looks like me. My mother's gonna like that picture." I felt that I could adopt any one of those kids.

## **12. The Cheese Stands Alone**

I was only sort of giving up on the Ph.D. I did want it, if only as a symbol, a kind of marker. Without a Ph.D., or at least working toward one, I felt as though math was slipping away from me. So when another professor at my school showed interest in my thesis, I gave him a copy to look over. Various friends were excited about that, but I knew better; I'd already been disappointed too many times. Two or three months passed. That seemed enough time so, from New York, I phoned this new professor. I expected him to say he hadn't gotten around to looking at it yet, but I didn't expect him to say what he did say. In a rather embarrassed tone: "I left your work in your mailbox along with an apologetic note explaining that I hadn't had time to read it and that I was going away for the summer and was thus returning it to you."

"You mean, you're not going to read it at all?"

"Well, no. I'll be in Seattle all summer and so I thought I'd just return it to you."

My luck, or whatever, with respect to this thesis had been down for two and a half years. It seemed that no matter what I did, no matter how good or bad that thesis was, my school didn't want to give me a Ph.D. and therefore wouldn't.

Another story about childishness in academia reached my ears. There is a very famous and useful field, the theory of random functions. Some years ago the originator of this field presented his theory to his school as a Ph.D. dissertation. It was not accepted. Possibly—ahem—the faculty there didn't feel qualified to judge it. Or they said "things like that aren't being done right now".

But Steve, my classmate, hit it lucky. Recall, he'd found an advisor at Columbia and our chair wanted to see a list of the guy's publications. Well, the guy was not offended and so he sent the list. Our chair was satisfied and the student was on his way. And I was not. "The cheese stands alone."

I couldn't help associating math with all the negative stuff that had happened, and with the too many mathematicians I'd met who didn't seem to love math the way I did and didn't seem to be good human beings either. Working on math felt a little like torture because I loved it but couldn't do it.

No, the mathematicians at my graduate school weren't like Pamela from my early-adolescent dream. I suppose I didn't expect them to be, but I also didn't want them to be the way they were. This vacation from math—or relative vacation—wasn't doing me much good. Math seemed so far away. I felt almost as though I'd never had math in the first place, and that felt scary.

### **13. Another Kid**

I wished I could feel in my gut that even if I never got the Ph.D. I was still worthy. Jeff said he didn't blame me for not having the degree, he knew I deserved it. But he did blame me for not sticking up for my rights. I was reminded of my mother, back when I was in seventh grade. I'd been afraid to show her my D in the history test and when I finally did show her she'd said it wasn't my grade that upset her but my hesitation to tell her about it. No matter what I did, it seemed, I would be blamed for something.

Besides, Jeff, just exactly what was I supposed to do to stick up for my rights? Was I supposed to seek out just one more possible advisor? To run around the world, stopping at every school, touting my thesis and its crazy situation? Was I supposed to have a tantrum at the chair, as well as the guy who said he'd read my thesis and didn't? Sometimes Jeff would say,

why don't you ask So-and-So to be your advisor? Often the reason was, So-and-So wasn't working in my field. But usually I was simply afraid to. I was afraid of all these accomplished, powerful mathematicians. And then, of course, I felt guilty for being afraid. Make one more phone call, apply for one more job... Jeff wanted me to. It felt like blaming, and punishing, the victim.

One day Jeff and I were taking a walk and across the street we saw an old disheveled woman talking to herself and to whomever else happened to pass by. "I wonder what's bothering her," Jeff remarked.

"Who knows?" I answered. "Maybe she's had 76 lovers in her lifetime and they all died and after she fell in love with the 77th, she gave that person up because she was afraid they'd die too." Or maybe 76 mathematicians had said they might be her Ph.D. advisor and they all wound up changing their minds and she was afraid to ask a 77th.

The day care center was not a permanent escape, but it was a good temporary one. That center was good for me, at that time. I felt so impressed and in love with these kids and with their caretakers. There was something about them that the kids and parents in my past experience didn't have. I decided that, when I had my own kids, I'd want them to be like these day care kids. I thought about what the adults in these kids' lives did to allow them to be that way. There was a casualness, I decided, a good casualness. When I had my own kids, I thought, I'd try my best to cultivate that kind of casualness. Yes, I learned things from working in the day care centers. I also cultivated a kind of casualness about the Ph.D. I felt better than I had in over two years. Besides, time passed. I cultivated, not only casualness, but also some kind of peace and perspective. With it went a dose of laziness. This time, though, there was very possibly a good reason for this laziness. Because something infinitely more wonderful than a Ph.D. might have happened to Jeff and me. We had been trying to get pregnant, and now I was several days late. A week or two more and I'd know for sure.

#### 14. Pseudo Order-Type Maps

In the meantime I gave the Ph.D. one more try. Another NYU undergrad professor, he'd been my topology prof. I went to see him and we talked about an hour, about my situation and a little about the thesis itself. I

didn't expect him to read all eighty-something pages but I did expect him to get some idea. Well, he didn't. He had a list of minor suggestions—he admitted they were minor—but once again I was told, “I'm not the man for you”. Yes, man. He did add that if he were part of the faculty at my school, he would sponsor my thesis but that under the circumstances he wouldn't stick his neck out. Well, Jeff, I tried. In fact, I tried-tried again.

But the thing that was infinitely more wonderful than a Ph.D. had indeed happened. I was happy, thrilled, proud—and lazy. And I didn't want my baby soiled by Ph.D. crap. I felt like something precious, special, fragile. No one had the right to hurt me. Armed with my little bumpy belly, I felt braver about pursuing that Ph.D. But I also didn't care very much about it.

Two and a half months pregnant, and one and a half months into morning sickness, I received a three-page handwritten letter from an eminent mathematician, one of the many potential advisors with whom somebody at NYU had put me in touch. Here's what he wrote:

*Dear Mrs. Cohen:*

*To some extent I am failing you. When I told Professor \_\_\_\_\_ that I would read your dissertation and comment on it, I labored under the misapprehension that your research was reasonably closely related to the sort of study of partially ordered spaces and order-preserving maps that I investigated some years ago. But I find that you are interested in subjects that, without being completely “out of sight” from my center of interest, are nevertheless in an area in which my opinions are of highly dubious value.*

*I have read approximately half the paper and find it sound and intelligible. (But on p. 5 line 7, even if I add in  $f$  does not equal 0 I still don't find it “easy to check”. Probably I missed the trick.) As I understand the program, you are first analyzing the structure of a theorem of Laurent Schwartz on the order of a distribution at a point (which is about as closely related to the kind of “order” I worked with as the order of a differential equation is related to an order of Brussels sprouts) and producing a generalization in which the essential ideas are allowed to provide the motive force. For awhile I was afraid that this was an exercise in mathematical dissection. I have little esteem for a pseudo-generalization that*

*contains no worthwhile special case other than the one purportedly generalized. However, on p. 6 and thereabouts you show that your generalization really does have content.*

*In my opinion, a research paper that analyzes an important theorem and produces an abstracted and generalized form that covers other examples is quite worthy of acceptance as a doctoral dissertation. I discussed your paper with Professor \_\_\_\_\_, who spent an hour of two looking through it and came up with the same opinion. However, if this paper had been sent to me to referee for publication in some journal I would have returned it to the editor with the suggestion that he find a better qualified referee. I could provide assurance that the work was soundly thought out and (at the cost of considerable time and effort) that the details were correct. What I could not evaluate would be the relevance of the paper in its field. It would take more expertise than I have to appreciate fully whether the idea is quite novel or is fairly close to something already more or less familiar. Moreover, I could not suggest to the editor that “pages x to y could be simplified by a modification of the procedure used by XYZ in —-“, nor can I now suggest to you, as I wish I could, the directions in which it would be profitable to go further.*

*I’m sorry I can’t be more helpful to you. Unfortunately, I’m just the wrong man.*

Yes, “man” again. And dead end again. Encouraging, perhaps. Reading it over these decades later, I’m impressed. Impressed, first, with his kindness, devoting considerable time to my thesis, and such a long, nice, modest, substantial letter. Secondly, I’m impressed with me! I must have written a reasonably thesis-like thesis.

But mostly, I craved thick and hearty vegetable soup! And liver and onions from Woolworths. And when would my stomach start getting big? When could I start buying maternity clothes in the thrift stores on 3rd Avenue?

## **15. Yep, Laurent Schwartz**

That summer, mid-July 1969, morning sickness having finally evaporated, I flew with Jeff to a physics conference in Israel. In those days the sciences

were wonderfully funded. Speakers and their families were flown all over the planet, put up in the best hotels, given a daily monetary allowance, enough to eat at the most expensive restaurants and still have money left over to put into savings, or shopping. Jeff was giving an invited address and I would be giving a ten-minute talk. My talk, “The Value of the Heaviside Function at Zero”, was on distribution theory itself, not pseudo order-type maps, not anything in my dissertation. I’d been working on the value of a distribution at a point; a Polish mathematician named Lowacewicz had provided a definition but the definition didn’t work for all distributions. I had a definition that did. It had disadvantages but it also worked well for certain distributions, in particular the Heaviside function that physicists were then and are now so interested in.

I had never given a conference talk. I’d never even taught. And I didn’t want to soil my baby with the whole business. In short, I felt like a pregnant woman who’d been through too much. Shortly before my talk I went into the ladies’ room and cried.

But then the crying ran out. And someone whom Jeff and I knew slightly joined me at the mirrors. She was Yvonne Choquet-Bruhat, a well-known physicist and mathematician who later became even more well-known (first woman to be elected to the *Académie des Sciences Française*). And she gave me the time of day! First we talked about her children and my pregnancy, and eventually I told her about my thesis, how paralyzed it had become. And she offered to communicate it—that’s the phrase, “communicate it” —to—guess who! Hint: Recall, the chair at my school said “And who knows? Maybe we can even get the man himself—Laurent Schwartz”. Yep, Laurent Schwartz.

There was a reason Laurent Schwartz was considered the mathematician of the day. He did not say “I don’t feel qualified”. Indeed he felt quite qualified, and willing, to read, judge, and—yes—approve my thesis. I’m sure he realized that it wasn’t really in the field of distribution theory, but it was self-contained, and he knew the field of mathematics. So he wrote my school a letter—in French, his first language, and I knew enough French to understand the copy he’d sent me. The letter is literally faded now, faded to almost nothing, but I remember the part that said my thesis was correct, new, original, well-written, worthy of publication, and of a Ph.D.

My school was impressed but for a while nothing happened. Well, something did happen—I had the baby! October 7, 1969 was her birth date. I hadn't known I could be that happy. I hadn't known about that feeling. "Exquisite" was the way I'd describe the experience of giving birth. The labor had been very short, active labor lasting three and a half hours. When I'd come in around midnight, my obstetrician, who lived across the street, had thought he'd get a full night's sleep. But he showed up, wide awake, at 3:37 AM, hopping around exclaiming, "Natural! That the only way to do it! That's the only way!" At the time natural was rare, along with daddy in the delivery room. Of course I felt proud. And Marielle was beautiful. Skin smooth and pink. Pug nose, more pug than other babies' noses! I didn't need a Ph.D, not even a little bit.

But I got it. One day, as three-month-old "Elle" was napping and I was doing some "post-thesis" math on "potms" into non-tosets, the phone rang. It was the professor from my school who'd promised to read my thesis but had gone off to Seattle instead. Would I like to have my defense in March?

There must be some catch, I thought, some trick, maybe a plot. Maybe—Kafka-style—they planned to corner me in the room and kill me. But indeed, Laurent Schwartz's letter had done it. And in March 1970—I forget the exact date—my father drove Jeff, baby Marielle, and me down to the state where my school is, still is. My father would be babysitter while Jeff sat in on the first part of my defense, where I would give a presentation on the thesis itself, and then Jeff and my father together would babysit while I answered whatever questions the committee might have.

So we made the three-hour trip and picked me up a Ph.D! They didn't kill me! In fact, they kind of had their tails between their legs. When my presentation of the thesis was over and it was time for them to ask me questions, they couldn't think of any since they hadn't been able to understand the thesis. They groped, found some words, put them into interrogative sentences. And after eventually uttering the obligatory "Could you please leave the room while we talk it over?" they murmured, "I don't think this will take very long". Indeed it took less than a minute—the time it takes to walk from the thesis defense room to the "waiting room". "Congratulations, Dr. Cohen!" they smiled.

A hearty thank you to both Yvonne Bruhat and Laurent Schwartz! And to those on the faculty of my school who were supportive of me and had, finally, been able to bear fruit. Over the decades, there has indeed been other suffering and other happiness. Employment disappointments and surprises. Four additional babies, three living. The poetry, published books, including *Crossing the Equal Sign*, about my passion for math. Jeff, when Elle was nine, diagnosed with multiple sclerosis. Our family's twenty-six-year odyssey. A second, very happy, marriage. Math is still, besides the people in my life, my first love, my strongest passion. The other day I looked through the thesis, typed up by the department secretary in amusingly primitive characters, nothing like what now comes out of my printer, but hardbound in handsome dark green. I recognized almost all of it, in fact improved some of the proofs. But I had forgotten how difficult the last few pages are, especially the parts that connect to topology. I couldn't understand them!

And yes, I sometimes still wonder. Laurent Schwartz was, besides a mathematician, an activist in causes. One of those causes was being against the war in Vietnam, and another was women's liberation. Would he do anything to get a woman mathematician her Ph.D? No matter how bad her thesis was? No matter how "trivial" or "irrelevant", as mathematicians say? And was his reputation so firmly established that he could get away with it? In other words, do I really have a Ph.D? It doesn't matter a whole lot, but every once in a while I wonder.