When 7,000 Mathematicians Come to Boston

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Most of my nine-hour train ride to Boston had been spent meticulously putting together a minute-by-minute schedule for the four-day Joint Mathematics Meetings, sketching out every talk, event, and social gathering I was going to attend. That was my naïve attempt to get the most out of my first JMM, which also happened to be the largest mathematics meeting in history, with over seven thousand attendees. But apparently such a rigid schedule is no way to approach a conference of this size, and my plan deteriorated during the first half hour.

My inaugural session's first talk had had an intriguing title, but when the speaker was a no-show and we sat in silence until the next scheduled talk, my JMM experience was off to quite the anticlimactic start. I slipped out of the session and went into the neighboring room, listening in on a PDE session and flipping through the program trying to regroup and find a 9 a.m. talk. "Hodge Theory and the Netflix Problem" in the unusual-sounding session of Generalized Cohomology Theories in Engineering Practice eventually won out, and I was rewarded with a standout talk. Lek-Heng Lim of Chicago explained how algebraic topology provided tools the applied Netflix Problem needed to create a global ranking (of movies in the specific case of Netflix) based only on sparse local rankings given by individual users in a system where transitivity fails in general. Fully warmed up and with my schedule officially abandoned, I was ready to start my ad hoc approach to the JMM in earnest.

My string of good talks continued when intuition led me to the Alan Turing session on the afternoon of the first day. It was a standing-room-only crowd gathered to listen to an impressive lineup of speakers: Marvin Minsky, the father of Artificial Intelligence; Martin Davis, expert on Hilbert's 10th Problem; and Andrew Hodges, biographer of Alan Turing. I sat crowded in the back for the first talk and settled into the rhythm of the session, taking notes on Martin Davis's talk. My favorite anecdote that Davis shared was that von Neumann's letter of recommendation for Turing spoke only of the latter's work with almost periodic orbits—and nothing at all about his results in logic—perhaps, according to Davis, because "[von Neumann] never forgave logic for what Gödel did to him."

During the huge exodus for the break between talks, I wound my way around and over people to the front of the room and strategically chose a seat in the front row, the middle of three vacant seats by the projector; this was too good a session to be stuck in the back corner of the room. But I was in for a surprise. The seat to my right filled with a session newcomer, whom I filled in with the details of Martin Davis's talk. Then the seat to my left was filled by none other than Davis himself. What a feeling it was to be bumping elbows with Martin Davis for the last two talks of the session.

Andrew Hodges spoke next and, probably because I will be entering a Ph.D. program in the coming years, two tidbits caught my attention: Turing had gotten a professorship without a Ph.D., and Turing's surprisingly broad academic background seemed to have heavily contributed to his research success and creativity. The former was just a sign of the times and how much smaller and more intimate the academic community was during Turing's era. But I was curious to what extent that second point translated to today's math climate. My impression of what current grad students are encouraged to do seemed contrary to Turing's wide-ranging research scope. Instead of working toward seeing the big picture of mathematics and the connections between fields, the name of the game in grad school seems to be passing quals and then specializing as quickly as possible to get into a small enough niche for a Ph.D. thesis.

I wanted to hear what others in the room thought about the narrow focus of the modern math thesis versus the broad thinking of characters like Turing, so I brought up the topic for discussion in Hodges's Q&A session. The audience became

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animated and gave varied and pointed opinions. A few thought it was only the place of geniuses like Turing to research broadly in this way and "mere mortals" should stick to their narrow niches. Others were passionate about the importance of broad thinking as an ingredient in healthy mathematics research. Still others saw a broad research scope as possible only in the bygone days of a smaller, less developed, world of mathematics. One practical response I got was that it is mandatory to specialize quite narrowly for the Ph.D. thesis, after which it is a good idea to branch out and keep about three parallel research lines going.

I got a full range of answers during the prolonged discussion, which turned out to be essentially an in-person MathOverflow thread with a special JMM flavor. Even in the days after the session, the discussion continued, as attendees would find me and ask, "You were the one who asked that question in the Turing session, right?" and away we'd go on some conversation.

The meetings' keynote speaker was Berkeley's Edward Frenkel, who gave a three-part lecture series on the Langlands program. Frenkel's talent in highly technical, deep areas of mathematics and his having earned a Harvard Ph.D. in one year are both obvious sources of inspiration, particularly for a student such as me with a thesis on the horizon. But I sought him out more specifically for two other unusual qualities: the cross-disciplinary nature of his research and his position as an accessible public figure representing mathematics to the world at large.

After his third and final keynote address, I joined a conversational circle of Frenkel and three others in front of the stage, and it was quickly obvious they were experts familiar with his line of research. I nodded along, enjoying the debates and clarifications on small technical points and waited for them to get through all they wanted to say. I was by no means contributing mathematically to the conversation, but Frenkel had the decency to include me in his eye contact sequence as he elaborated on this topic and that.

When their conversation had petered out, it was my turn, and others in the circle lingered to hear what I had to say. We got to talking about what I saw as a main thread running through the meetings: that many of the best recent results were due in part to broad thinking and the cross-fertilization of disciplines. The JMM had been full of illustrations of this trend: Frenkel on moving between the worlds of number theory and the geometry of Riemann surfaces via results from curves over a finite field; Joseph Silverman on dynamics in number theory; Lek-Heng Lim using cohomology's Hodge Theory to attack the Netflix Problem; Larry Guth on applying the polynomial method to knock down old questions in combinatorics; Hee Oh ending up deep in dynamics and hyperbolic geometry and even applying the Poincaré Extension Theorem in her study of Apollonian circle packings; and Allen Knutson's unusual explanation of how he was decomposing varieties so they could be studied with combinatorial tools, which he memorably demonstrated with juggling patterns performed on stage throughout his talk.

The topic of our conversation in front of the stage then shifted to the all-too-neglected task of connecting the math world back to the public. Frenkel has done some unusual work producing a math-oriented artistic film, and he is also skilled at speaking accessibly to general math audiences and the general public alike. Somehow, math has lost the public's attention, and a festering disconnect between our world and theirs has resulted in the public thinking that mathematics is arithmetic and mathematicians are calculators. Wouldn't it be possible to fix that image by sharing with the nonmath populace some of our most beautiful results in a nontechnical way?

In fact, perhaps we should start within the math community and fix the frustrating trend that has led the seminars in many departments to become so technical as to be largely inaccessible to anyone who did not coauthor the research being presented. But, while there may be a need for improvement in our communication within and outside the world of mathematics, the JMM featured some refreshingly intelligible talks, so if those data points are a representative sample, then the future looks hopeful.

Other priceless moments rounded out my JMM experience, including chatting with the president of the AMS, Eric Friedlander, about topics ranging from Virginian accents to a women's postbaccalaureate program at Smith College; visiting MIT and Harvard in person for the first time; hosting my department's table at the grad school fair and speaking with prospective students; attending Princeton valedictorian John Pardon's talk on his solution to an old question posed by Gromov on knot distortion; reaching for a Springer Ricci flow book at the same time as another mathematician, who in turn told me what Richard Hamilton is like as a person; having a chance meeting in the Press Room with Princeton Ph.D.-turned-math-writer Dana Mackenzie; and wandering around Boston to get a taste for the city's intellectual personality.

I left the meetings several lessons the wiser. When given only four days to mingle with seven thousand mathematicians, it turns out the best way to make the most of that short time is by using snap judgment and spur-of-the-moment instinct. Keep an eye out for opportunities, grab them when they present themselves, and mingle constantly, since you can never guess the fascinating stories an ordinary-looking mathematician keeps locked up in his head.