What I Learned
At the 2015
NCTM Annual Meeting

I learned a lot at the NCTM Annual Meeting (April 16–18, 2015), held in Boston for the first time in 20 years. Although there were, of course, some hits and some misses, it was definitely a worthwhile experience, with far more hits than misses.

Three Big Ideas kept reappearing throughout the program — at least in the talks that I attended and from the vendors that I visited:

- Common Core State Standards
- Transformational geometry
- Real-world applications

Networking/personal interactions

Before getting onto the content, let's talk briefly about the people. I was told that there were 30,000 people there, but the NCTM only claims 10,000; I'm inclined to believe the NCTM, as 10,000 would be overwhelming enough. I'm sure that my discrete math colleagues could tell me how to estimate the crowd. Despite the large number, I actually ran into several people I knew, two by design and others by chance.

Both Thursday and Friday I talked with my sister Ellen, whose point of view was compatible with mine but with a different orientation, as she works with younger and older students than the ones I teach. The other scheduled interaction was with my former student Ada Glover née Lipkin (erstwhile Math Team star, MIT student, and sister of current WHS student Rachel Lipkin). According to her website, she has been a newlywed for the past 574 days and is currently developing educational software for a hush-hush startup. We had a great conversation for almost an hour.

Unscheduled interactions were with Alison Langsdorf (current colleague), Cindy Carter (known to some as Paul Goldenberg's wife and co-author and to others as the former math teacher of Katie Rich), Brian Abend (former WHS teacher, currently at Worcester Academy), and several math team coaches from Lexington and Winchester. Of the 10,000 attendees, I did not run into current colleague Jim McLaughlin, nor my cousin Jake Nunes (who teaches math at Shady Hill), nor any cats. Probably no cats were there, but Jim and Jake were.

Speakers

Some believe that networking is the main point of a conference, but the core IMHO was the set of speakers:

- **Dan Meyer**

  To no one's surprise, Dan Meyer gave an inspired and inspiring presentation. Also to no one's surprise, he focused on modeling, with an emphasis on real-world vs. "fake-world" math, and urging us to "get rid of the questions." He used a lovely example, starting with wondering "What does UPS care about?" What info matters? What doesn't? It turns out that the average UPS driver makes 130 stops per day, but Meyer asked us first to guess and share our estimates. He talked a lot about queuing theory (Bailey? Jim? Mary?). Memorable quote: "The express line is for suckers.") He contrasted this situation with the typical textbook, which provides an unmotivated "correct" model. As we already know from Meyer's work, his foundational question was "What info would you need here?" He urged us to pick problems that are "enticing, inviting, and not intimidating." At first we should be disorganized, and then should improve our model. Sometimes we need to say "We're going to need a bigger boat" (but change it to "better model"). As always, Meyer observed that videos can be very powerful and urged us to ask *different questions* about the real world. "How do you know it's a good problem?" Answer from one fourth-grader: "Because it makes my brain feel like it wants to pee." Meyer focused on the Common Core math practices #1, 2, 7, and 8. (You can look them up.) Useful references are nctm15.mrmeyer.com (with lots of good links!) and robert-kaplinsky.com.

- **Sherry Fraser**

  The most important observation by Sherry Fraser from IMP was that the majority of teachers are happy with the Common Core standards for K–8 but the large majority are unhappy with the 9–12 standards. This certainly resonates with my impressions, but it was useful to see them backed up by actual data. In particular, the philosophy for the 9–12 standards seems exactly backwards from what they're supposed to be. As Fraser said, "they aren't a mile wide and an inch deep; they're three quarters of an inch deep."

- **Ignite!**

  Apparently the format of this talk is a staple, but I'd never been to one before. There are ten speakers, one after another; each has exactly five minutes and must show 20 slides. The clock enforces the time limits, advancing the slides every 15 seconds, ready or not. Although these constraints might sound ridiculous, they actually encourage creativity, just as the constraints of writing a sonnet or haiku do [my own analogy, but I think

it's right]. Seven of the ten talks were worthwhile, an impressively high ratio. (Two of the weak speakers were emergency substitutes, who had too little time to prepare.) Each speaker had to introduce herself or himself with "two truths and a lie," thus upping the interest level even more. The charge was to talk about whatever ignites your passions, and a lot came out about the three Big Ideas outlined above, including various doubts about the Common Core. I particularly liked Eric Milou (see [his website](#)).

- **Scott Steketee and Daniel Scher**
  This talk, though not as exciting as Dan Meyer's or Ignite!, was directly relevant to both of the courses I teach (algebra II and geometry). Called "Geometric Transformations and Linear Functions: Two Sides of a Coin," it made a convincing case for altering our approach to both of these topics in order to make the connections clear, compelling, and explicit. Functions have variables in one dimension (the number line, a.k.a. Lineland), transformations in two dimensions (the plane, a.k.a. Flatland). We compose geometric functions to create linear ones (dilation and translation). We use Dynagraphs as well as Cartesian representations. As the last paragraph of the speakers' handout says, "by treating geometric transformations as functions, student *vary* the variables by dragging them, observe *rate of change* by watching the variables move, use meaningful *function notation,* and forge a strong link between *geometry and algebra.*" Their software and activities are designed to enforce that link, and along with way demystify function notation. They claim that kids will no longer think that "f(x)" means *f* times *x.* (We'll see.) They have a blog at Key Curriculum Press and activities at [geometricfunctions.org/nctm2015.html](#) and [geometricfunctions.org/cartesian-connection/mt-supplement/nctm-2015.shtml](#). Check them out!

- **Zalman Usiskin**
  It was a necessary pleasure to attend a talk by the distinguished Zalman Usiskin, who was a inspirational force in my teaching going all the way back to the '70s. Although Usiskin loves the Common Core's renewed emphasis on transformation geometry, he concludes that they have the wrong definition of "transformation"! (That's pedagogically wrong, not mathematically wrong.) Defining a transformation as a type of function is too abstract for most students. Usiskin wants to use function notation, but not to categorize transformations that way. He also objects to saying that graphs are representations of functions. Instead, they're geometric objects in their own right (making a close tie with the Steketee talk). Also, he says that Isometries are not "rigid motions": the transformation is a *model* of a motion, but it's not a motion itself. He also made a case for considering a glide reflection to be a *single* transformation (a "step"), not a composition of two. Finally, despite the fact that he finds a lot to like, he observes that

"there's no fun in the Common Core" — at least at the high-school level.

- **Peg Kenney**
Our local Peg Kenney gave a fine talk on mathematical practices, focusing on detecting patterns in numbers. Although it was well done and interesting, I didn't actually learn anything, as I could have given the entire talk myself. (Not her fault, of course, but that's why I stayed away from all four cryptography talks, as interesting as they might be.)

- **Nancy Anderson**
Another local math teacher, Nancy Anderson, gave a competent but ultimately unexciting talk on misconceptions concerning mathematical discourse in the classroom. Perhaps it would have been more useful if I held more discussions in my classroom, or perhaps if she were a high-school teacher. (She's the K–8 math coordinator at Milton Academy.) But ultimately the point is that I don't remember a whole lot about the talk, so apparently it didn't make much of an impression on me.

- **Bob Moses**
This talk about the Algebra Project was the only disaster among everything I saw or heard at the conference. Although he's younger than Marty Badoian, Bob Moses is apparently no longer able to give a presentation, so he talked for about 30 seconds and then turned the talk over to his assistants. The premise of the talk seemed somewhat promising: about 35 real live fifth-graders from the Higginson Lewis School would collaboratively find patterns in the prime factorization of one- and two-digit numbers in front of our eyes. We sat around round tables, each containing four kids, four teacher attendees, and a facilitator (either a teacher or an MLW, which is a TLA you probably have never heard of[*]). The rules said that "teachers are asked to be silent observers," which made the whole thing tedious. But what was worse was that the facilitator at my table insisted that 15 is prime (because its factors are 3 and 5, both of which are prime) and that 81 is an even number (because it has the factor 3 four times, and four is an even number). One of the fifth graders tried to argue with her, but to no avail. And this facilitator was a teacher, not a high-school student! Unfortunately we were not allowed to intervene.

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[*] Me neither. It turns out to be a "Math Literacy Worker," a.k.a. a high-school student getting Community Service credit.

- **Mike North**

  The closing talk, by Mike North, just rubbed me the wrong way. The least said about it, the better. Maybe Jim or Alison had a more satisfactory experience with it.

Missed speakers

Unfortunately there were two talks that I really wanted to attend but couldn't get into. Even arriving 10–15 minutes early, I found there no seats left in either case, and the fire code prohibits standees. One was a presentation on Mathalicious (see below under Vendors), the other a talk by Hannah Schuchhardt on "Establishing a Culture of Perseverance." (I walked for three city blocks but couldn't get in, despite persevering). Maybe Jim or Alison got into one or both of these and can report back.

Vendors

There were over a hundred vendors, mostly with materials promising compatibility with the Common Core. Compatibility is often in the eye of the beholder. I liked what I saw at five booths in particular:

- I got a few books from the **NCTM** booth; I'll bring them to school for anyone who wants to look through them.
- **Mathalicious** looked promising, with lots of real-world apps. I only wish I could have gotten into the talk about them (see above). Next week we can follow through.
- **RobotsLab** had absolutely fascinating demos with four very different robots, including a quad copter that the student can control (very impressive to see it lift off the floor or the hall). They have lots of associated lessons for high-school math, but the whole thing is quite pricey (unsurprisingly so, but still I don't see WEEFC wanting to invest $3500 in it).
- **Desmos** of course is familiar, but they had some great stuff. More on that later.
- **Knewton** is new to me, but looks like a great way to differentiate instruction.

Food and Transportation

In case you ever attend an event at the BCEC, be aware that the food ranges from adequate to terrible, with a median score of mediocre. Also, it's vastly overpriced. And if you're going to take public transportation, the Silver Line is great, with a stop only a short block away, but the walk from South Station is also good — avoiding a transfer if you're already on the Red Line, and providing a good replacement for going to the gym that day.