

Where Math Meets Imagination



**Interview with Glen Whitney,
Founder and Co-Executive Director
of The Museum of Mathematics**

by Melissa Hartman



*Come with me and you'll be
In a world of pure imagination
Take a look and you'll see
Into your imagination*

—“Pure Imagination” from *Willie Wonka and the Chocolate Factory*

For Glen Whitney, founder of the Museum of Mathematics, this song was the perfect soundtrack for the unveiling of a project he'd been envisioning and working on for over four years. In December 2012, the song filled the New York museum as supporters previewed the space a few days ahead of its public opening.

With co-executive director Cindy Lawrence and designer Tim Nissen—and with the support of passionate trustees, advisors, volunteers, and mentors—Whitney had created a space where math is not only beautiful to behold, but fun to experience. At MoMath, as the museum is affectionately known, visitors engage with math in unexpected ways—leading, Whitney hopes, to an appreciation that lasts long after they walk out the museum doors.

You were a fan of the Goudreau Museum of Mathematics in Art and Science, which closed in 2006. Are there elements of that museum that you wanted to capture in your museum?

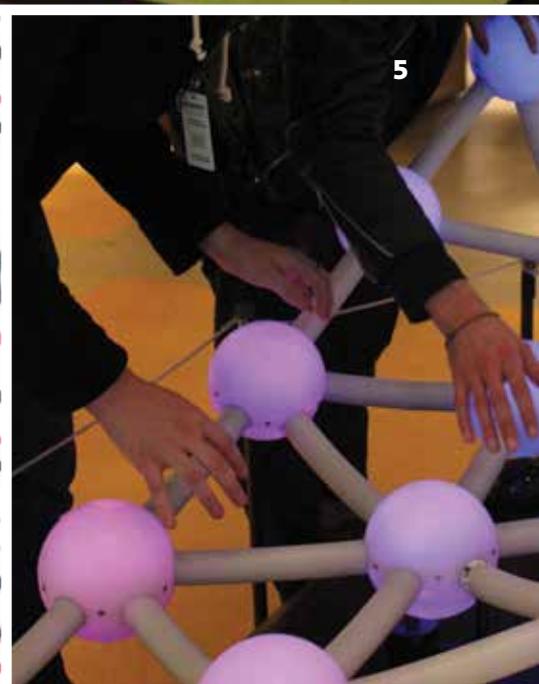
Absolutely. We wanted an immersion atmosphere, where you step into a world of math and there are math-y things everywhere. The Goudreau did this with lots of polyhedra hung from the rafters—unusual polyhedra that you wouldn't normally see. We have a three-dimensional shadow of a four-dimensional truncated hyperdo-decahedron hanging not too far from the entrance. Right in the door as you come in, we have Matthew Brand's *Light Grooves*, which are almost like three-dimensional sculptures of light. Everything is vivid and eye-catching and immediately defies expectations as soon as people step in the door.

The other thing about the Goudreau was that as a visitor you were very involved. There were puzzles. There were shapes that you tried to fit together and so on. The visitor breathed life into everything in the Goudreau. It was all about personal exploration. We've tried to create that kind of atmosphere here. There are lots of open-ended things that you can play with; you can discover what you want to discover. Everybody can explore the things that are meaningful to them, at their own speed.

Your website says that the museum is designed for kids in grades four to eight, but it's clear that it attracts and engages a much broader audience than that. Why do you think that is?

Math is something that can be appreciated at many different levels of depth. Take our square-wheeled tricycle, which has become the museum's iconic exhibit in many ways. On a simple level, you can just enjoy the sensation of riding on the tricycle. At the next level you might ask, “How can you make square wheels roll?” And then you'd realize that there's something special about the track.

At the next level you might say, “Hey, I noticed that the wheels on each tricycle are all three different sizes. Why is that?” and you learn about the linear relationship between circumference and radius of a circle. And then maybe in a couple levels you would ask, “Well, what kind of curve is that on the track?” And the answer is that it's a catenary, which is the kind of curve you get when you hold a chain at two ends and let it dangle freely. And by the time you're asking, “Well, how do you know it's a





1) Coaster Rollers: a smooth ride on lumpy rollers 2) Formula Morph: altering the parameters of algebraic equations with the turn of a dial 3) Light Grooves by Matthew Brand: a display of 3D holograms animated by moving lights 4) Human Tree: where visitors see themselves as fractals 5) Harmony of the Spheres: hearing and seeing music come to life 6) Polypaint: creating patterns with an electronic paintbrush 7) Welcome to MoMath! 8) String Product: a 23-foot-tall paraboloid that also happens to be a working calculator

catenary and how do you solve that?” you’re in differential equations and the calculus of variations.

At every exhibit, there is always the mathematics that lets people get their feet wet. Then, when they think about it more deeply, they can discover some really amazing and beautiful things. People can keep revisiting the seemingly simple things and thinking about them deeply and discovering new wonders.

How did you come up with the ideas for your exhibits?

That was one thing we never had a shortage of: great exhibit ideas. When we got the project going, we started talking to lots of people and set up a wiki where anybody could go and basically just type in their ideas. We gave a password to anybody who asked and just started collecting ideas. When we were ready to start designing this museum, we had collected almost 400 ideas, and that was after discarding the ones that were just completely implausible.

I think part of the reason there was such an outpouring is that a lot of people who deal with math every day on a professional basis have the sense that they’re working in something that’s a little underappreciated and not clearly understood by people. They wanted to share the beauty and the joy they feel. We have a bunch of exhibits in the museum that came to be exactly by that story.

Can you tell me about one of those?

We were visiting the Wolfram Research headquarters and bumped into Theo Gray. He said, “You know, I have been wanting to do a math museum forever and I even mentioned it to a museum or two. Nobody’s ever done it, but maybe you guys can.” And then he said, “Wouldn’t it be great if you could stand up in front of a screen and you hold your arms up in the air and then it makes a fractal tree out of you by replacing your arms with a smaller copy of your photo and the arms of that with a smaller copy and so on and so on?” That’s now the Human Tree exhibit on the lower level of MoMath. We added some of our own MoMath special sauce to the idea, but Theo’s suggestion is the heart of the exhibit.

What is your favorite exhibit right now?

That would be like choosing my favorite child. That said, I am particularly enthusiastic about the exhibits that offer a full-body experience, that get you up and moving, on your feet, moving your entire body just because I personally find that to be just much more satisfying, memorable. I feel really immersed when I’m at those exhibits. Those would include the square-wheeled tricycle, Human

Tree, and Coaster Rollers, where you get to ride in a cart on non-spherical ball bearings. It’s amazing that such things should exist, but they do.

Before building a museum, we had a traveling exhibit called the *Math Midway*. One of the great things about having the larger space of this building is that we could take a traveling exhibit and make it gigantic. We did that with the Ring of Fire. It’s now the Wall of Fire, where you can walk through a plane of laser lights. Not only can you see cross-sections of the translucent geometric shapes we have, but there’s a mirror set up so you can see your own cross-sections unfold as you walk through. So we took an exhibit that wasn’t full-body and now it is full-body here in MoMath, and I’m very pleased that we were able to do that. Those are my favorite types of exhibits.

Have any reactions from visitors been particularly meaningful to you?

The first thing that comes to mind happened on the *Math Midway* debut day back on June 14, 2009. There was a young girl who was maybe four or five playing with a giant geometry puzzle called the Tetraxis. When she slid in the last piece, she turned around and, with a huge look of delight on her face, she said, “Mommy, Mommy! There’s *math* in there!” I will never forget that experience, ever.

More recently, there’s a story I’ve heard multiple times and am absolutely thrilled every time I hear it. That’s the parent who says, “I had to drag my little Sheila out of the house to get her to come to the museum. But as soon as we got in the door, she ran away, and now it’s time to go and I can’t drag her out.” That’s always a thrill because it really feels like, at least for that day but hopefully as an ongoing thing, we really changed some young person’s view about what math is and what their attitude toward it is.

Do you have plans to expand the museum?

Well, we are in a small space and we could be in a bigger space someday. But regardless of how big a space we’re in, the delight of the pursuit of math is something that transcends any walls that we might have. We are very much looking to make MoMath a community, not just a museum, and to have lots of opportunities for people to contribute. You can put programs on the Math Square. You’ll be able to design programs for our Dynamic Wall exhibit, which will be opening in a month or two. There are lots of ways people can contribute ideas and content to the museum and we welcome them all. We’re always delighted to hear from folks, and there are lots of ways that they can become a part of the MoMath community. **i**