Humanistic Mathematics: A Philosophy, a Journal, and a Community

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12 Nov, 2015

Humanistic Mathematics

I use the term here to mean aesthetic, cultural, historical, literary, pedagogical, philosophical, psychological, and sociological aspects of mathematics as a human endeavor.

- Created by Gizem Karaali
- Rebirth of Alvin White's Humanistic Mathematics Network Journal
- Editors: Gizem Karaali and Mark Huber
- First issue published in Jan 2011
- Twice a year publication, open access (free to authors)
- Online: `http://scholarship.claremont.edu/jhm/`

Architecture: Mathematics made visible

Brú na Bóinne

Neolithic site (35th-32nd century BCE)

Photo: MLH

Inner sanctum designed for the sun to hit on winter solstice

Megalithic Art at Brú na Bóinne

Photo: MLH

Kheops pyramid

Photo: Nina Aldun Thune

La Tour Eiffel

Photo: MLH

The Gateway Arch

Photo: MLH

The Guggenheim Museum

Photo: MLH

Sydney Opera House

Photo: MLH

Back to polyhedra…

Photo: MLH

A Crop Circle that encodes the first ten digits of π

Photo: Author unknown

A Julia Set Crop circle

Photo: Author unknown

Art

Raphael's The School of Athens

Raphael's School of Athens (Photo: MLH)

Raphael's The School of Athens

Raphael's School of Athens (Photo: MLH)

Raphael's The School of Athens

Raphael's School of Athens (Photo: MLH)

What was Raphael having Euclid prove?

Raphael's *School of Athens*:
A Theorem in a Painting?

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Abstract

Raphael's famous painting *The School of Athens* includes a geometer, presumably Euclid himself, demonstrating a construction to his fascinated students. But what theorem are they all studying? This article first introduces the painting, and describes Raphael's lifelong friendship with the eminent mathematician Paulus of Middelburg. It then presents several conjectured explanations, notably a theorem about a hexagram (Fichtner), or alternatively that the construction may be architecturally symbolic (Valtieri). The author finally offers his own "null hypothesis": that the scene does not show any actual mathematics, but simply the fascination, excitement, and joy of mathematicians at their work.

Raphael's famous painting *The School of Athens* shows among the great

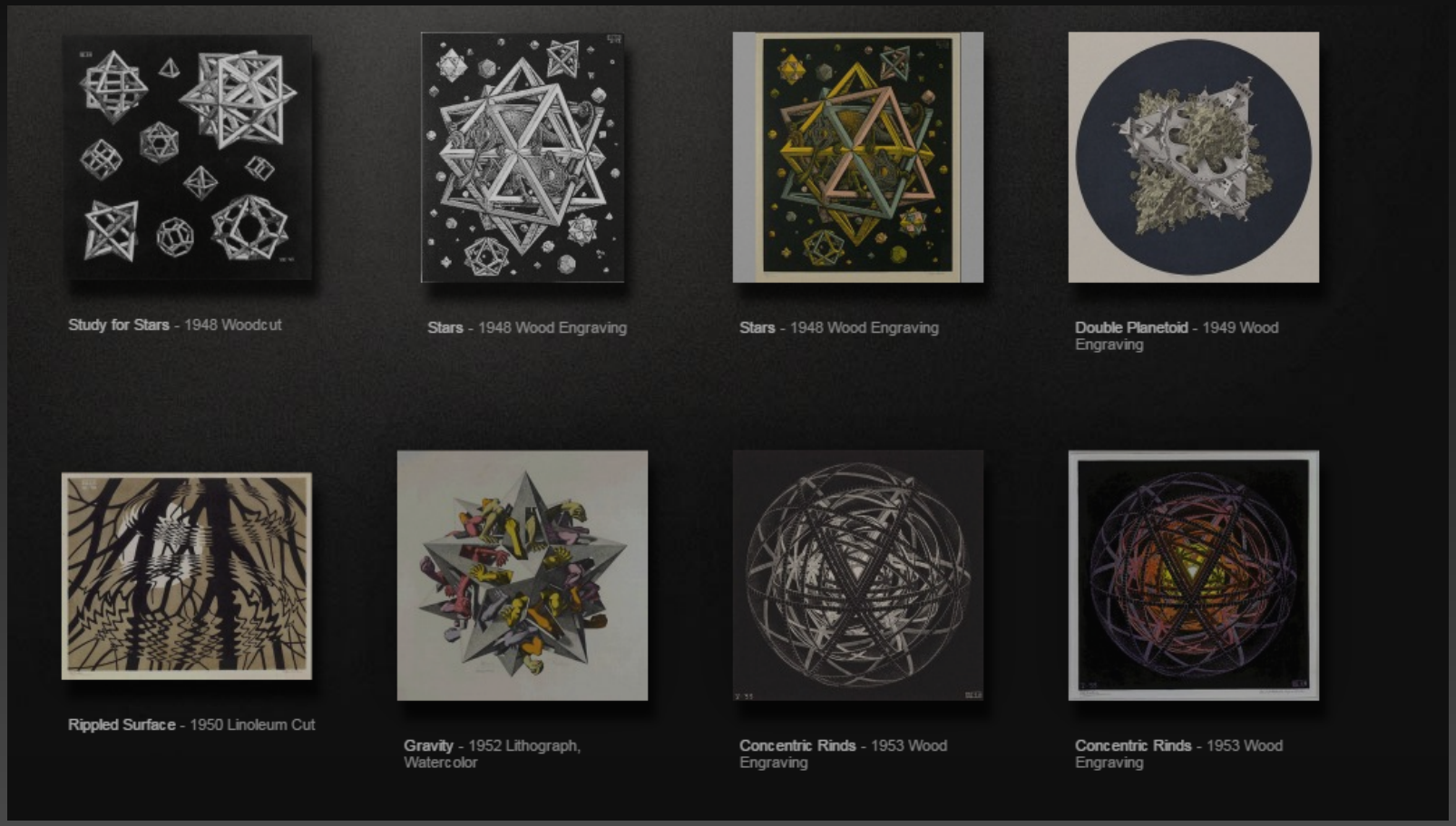
http://scholarship.claremont.edu/jhm/vol2/iss2/3/

The mathematics of the painting

Mathematics used in several ways in article

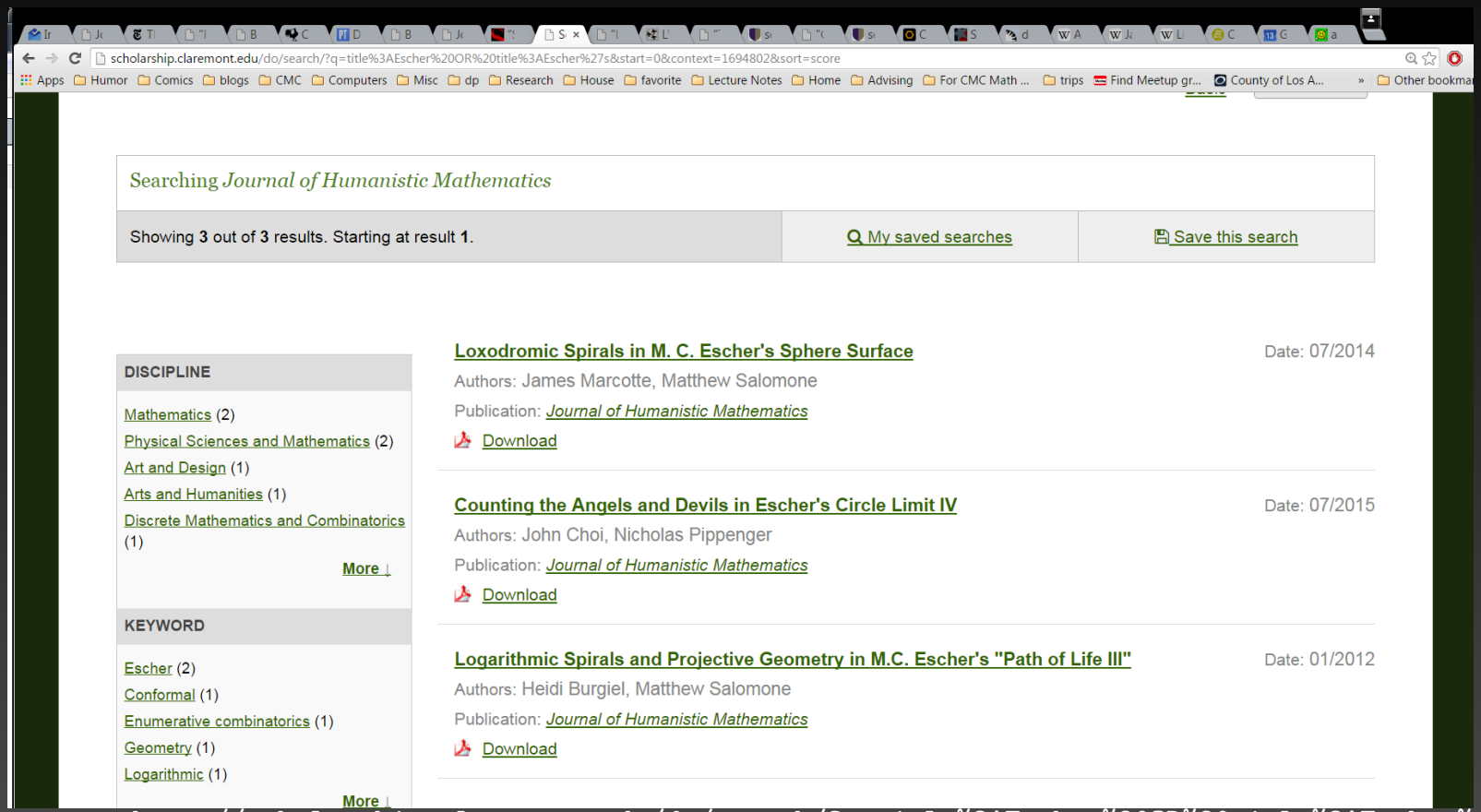
- Need to use math to undo perspective and see what figure would be from above
- Need to show that a candidate theorem is actually true

M.C. Escher



http://www.mcescher.com/gallery/mathematical/

M.C. Escher



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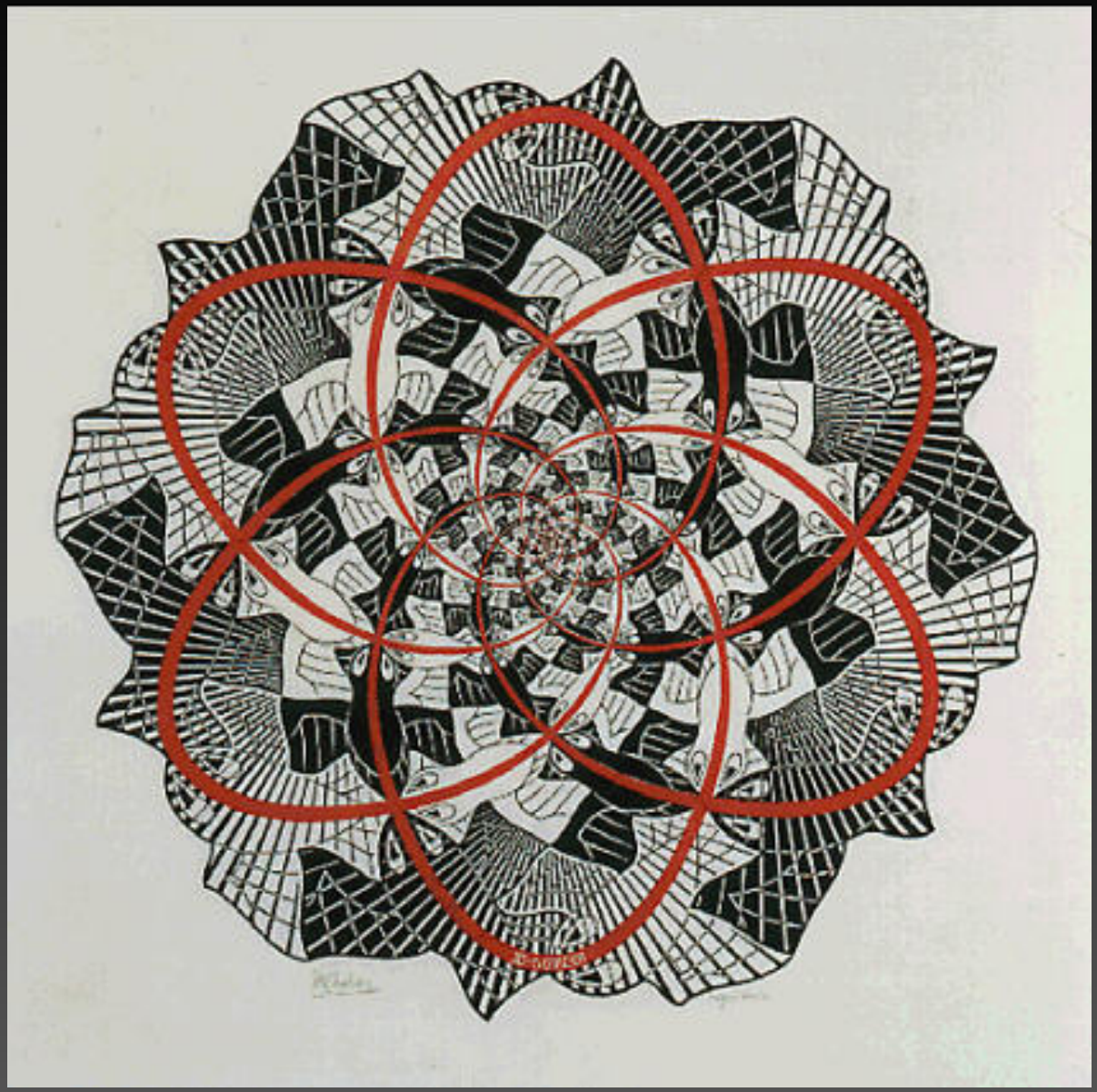
Escher's Sphere Surface

http://www.mcescher.com/Gallery/recogn-bmp/LW427.jpg

Escher's Path of Life III



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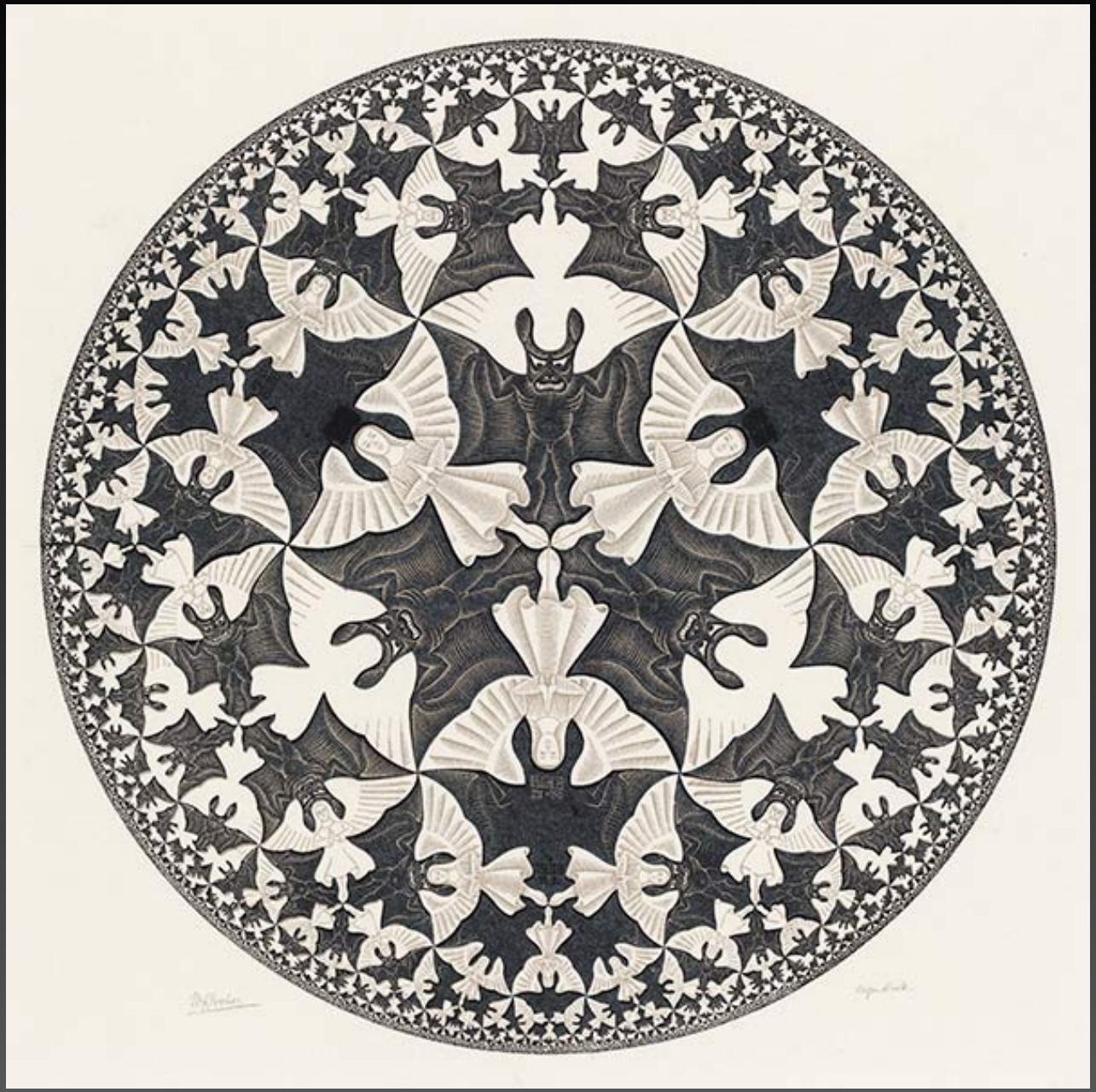
Escher's Circle Limit IV



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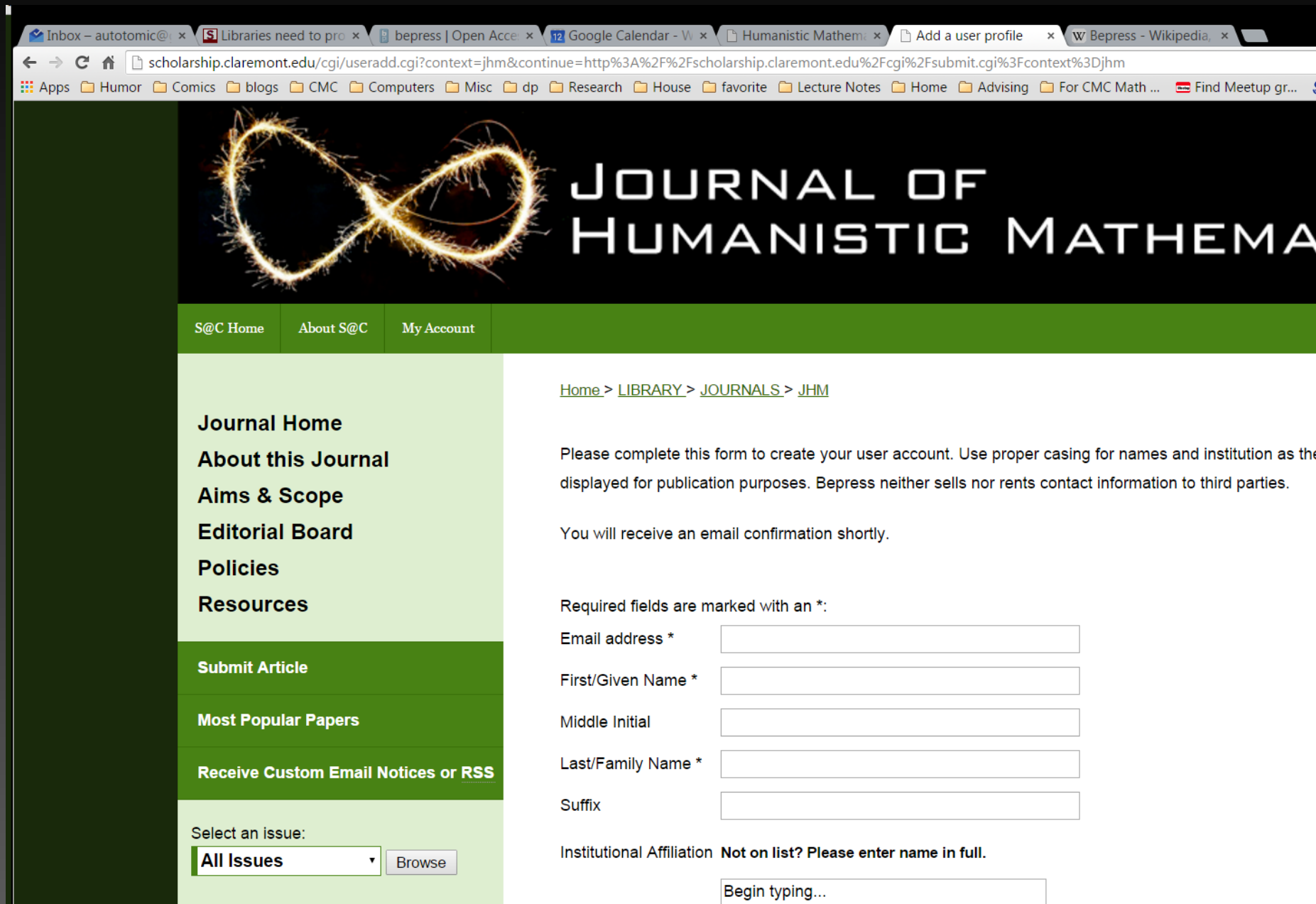
- Creating final published version of the journal then easy

Creating an account



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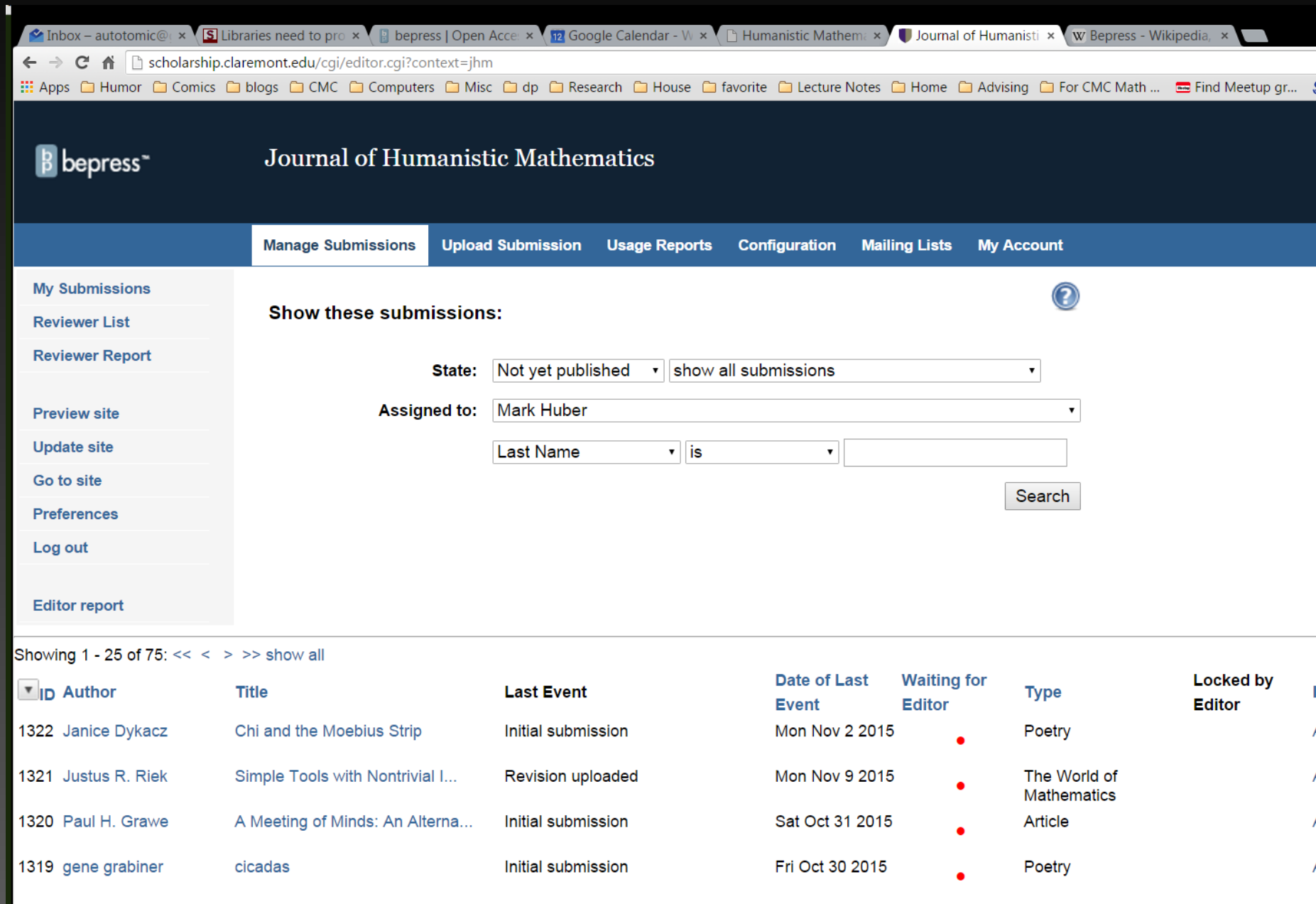
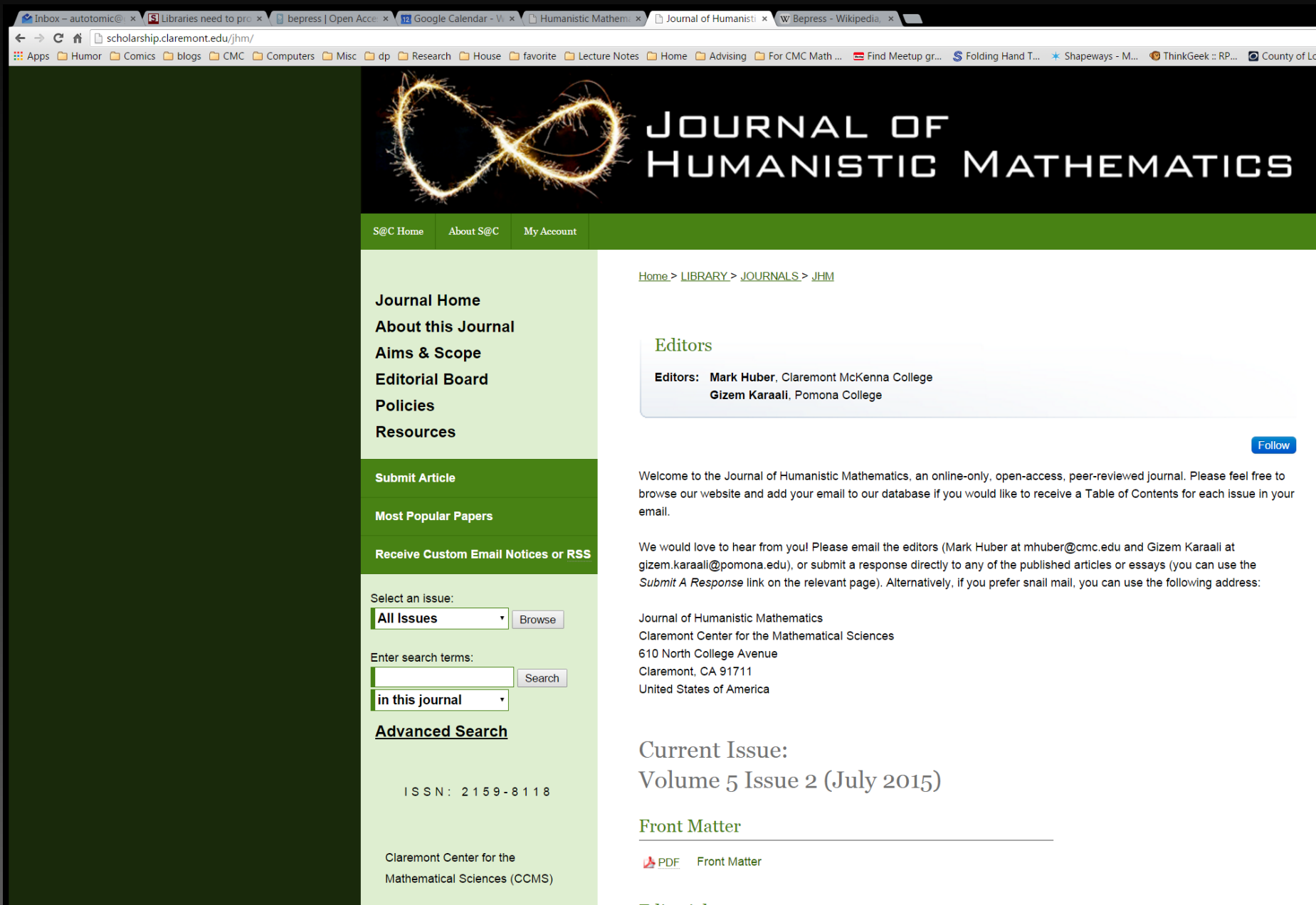
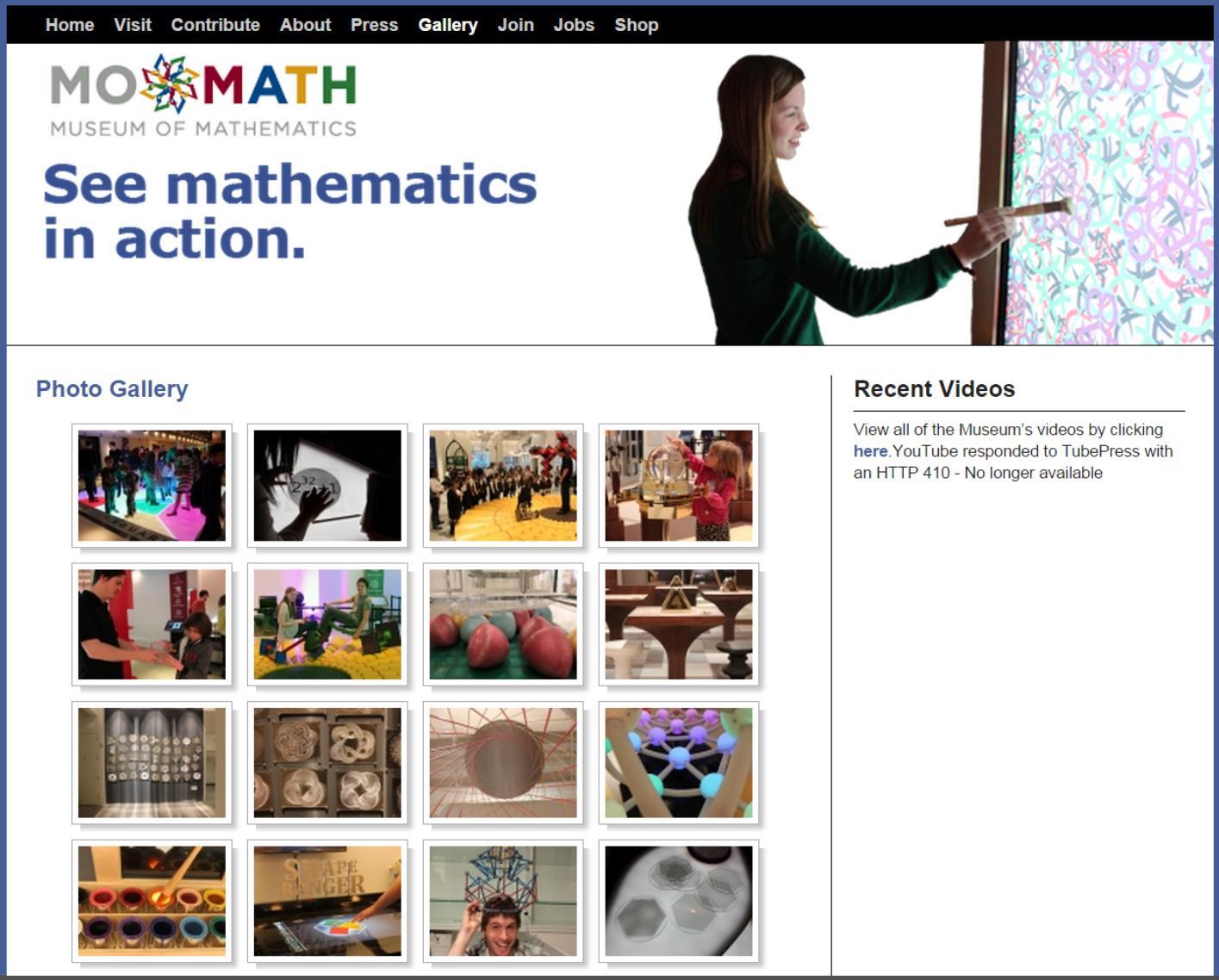


The final product



Involving the public with math

National Museum of Mathematics



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National Museum of Mathematics

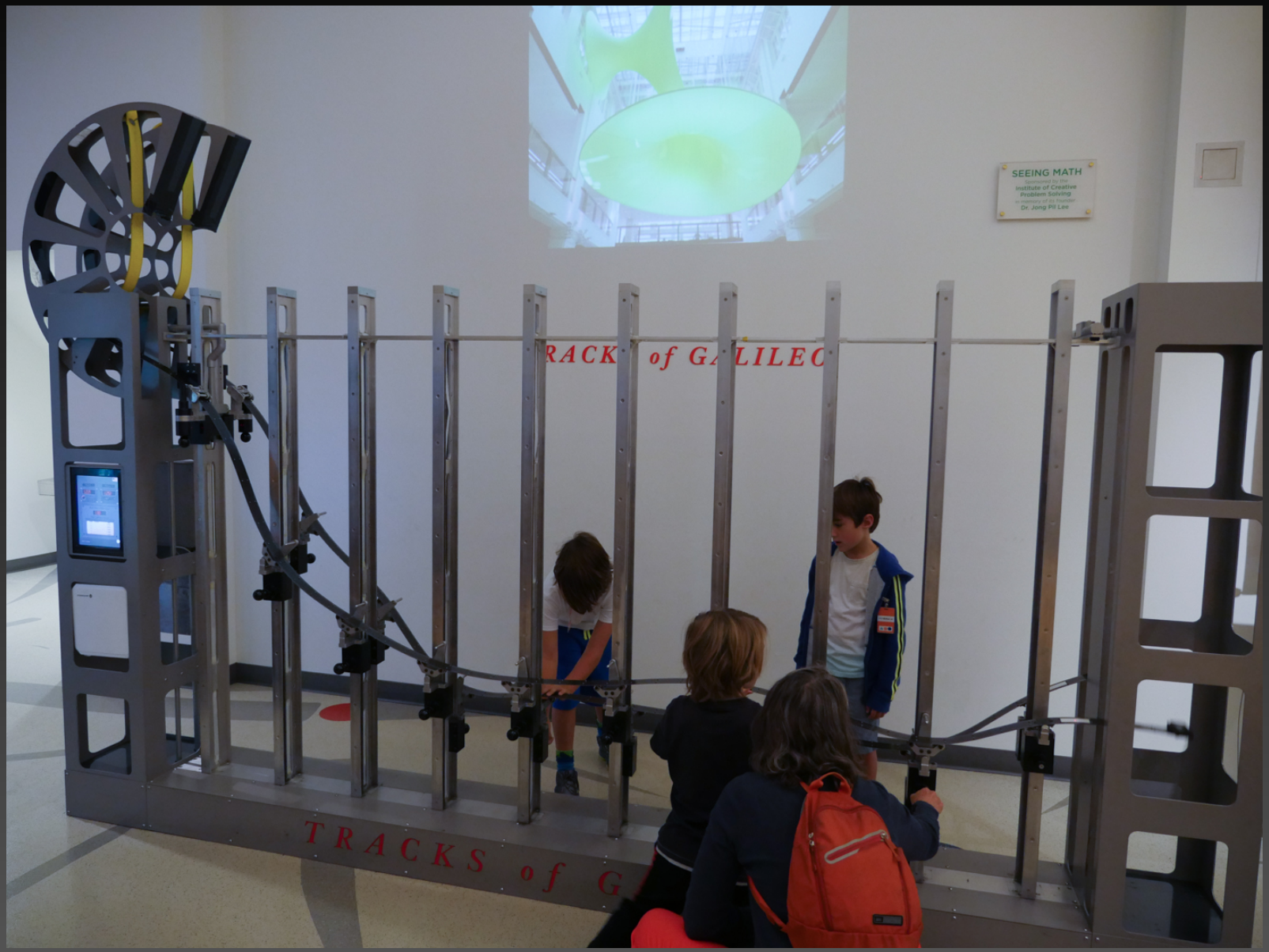

Photo: MLH

National Museum of Mathematics

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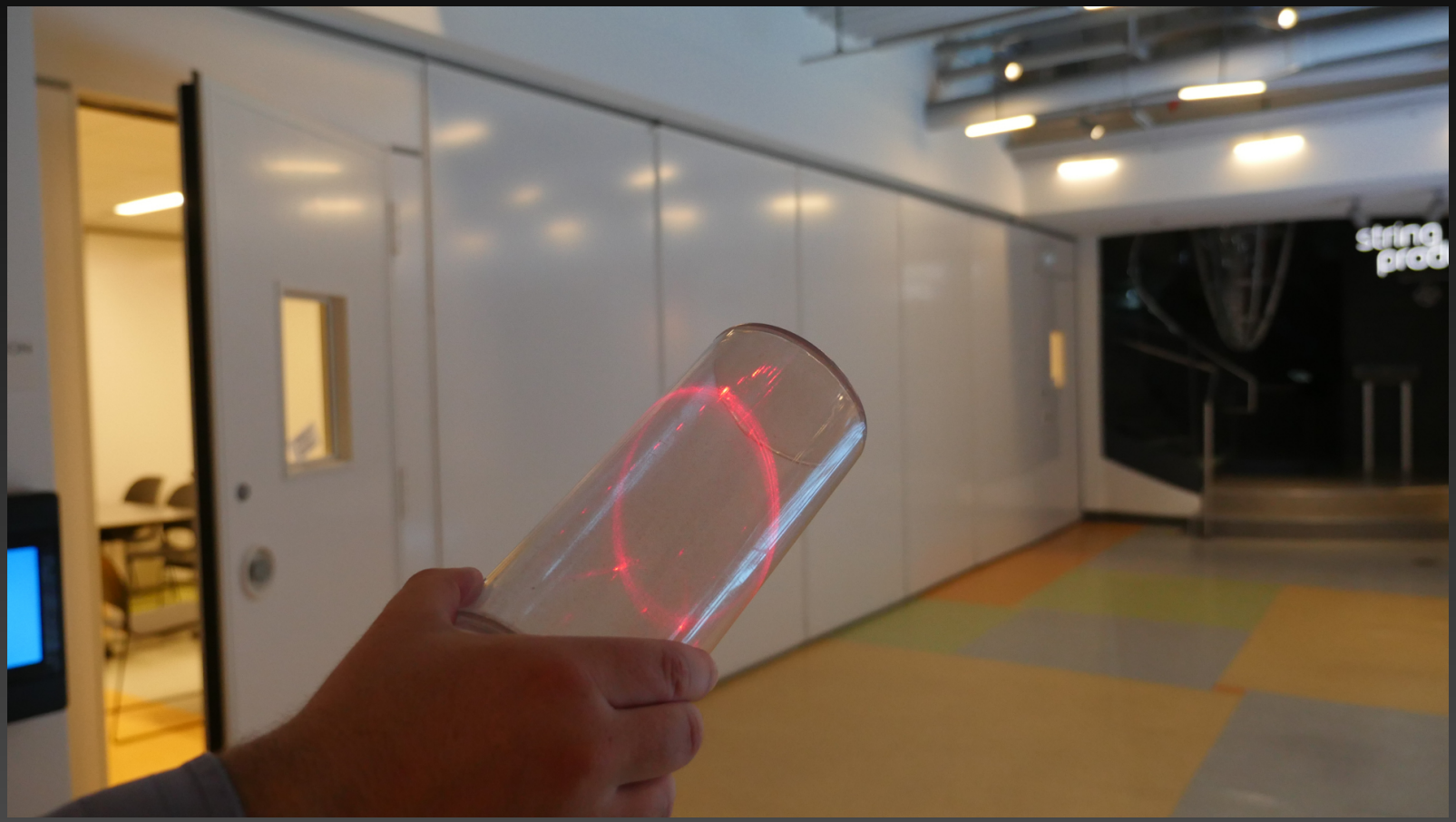

Photo: MLH

National Museum of Mathematics

Mo'Math Mo'Fun!

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Synopsis

A youth named Kartik encounters the National Museum of Mathematics in NYC.

In 2006, the only mathematics museum in The United States at the time, The Goudreau Museum, shut its doors. Shortly after, a team began planning to create a Museum of Mathematics with a much larger scope. Led by Glen Whitney, a hedge fund quantitative analyst at Renaissance Technologies, a group of innovators got to work dreaming up the museum. Prior to opening, the museum raised over 22 million dollars; this enabled the idea to morph into an incredible reality.

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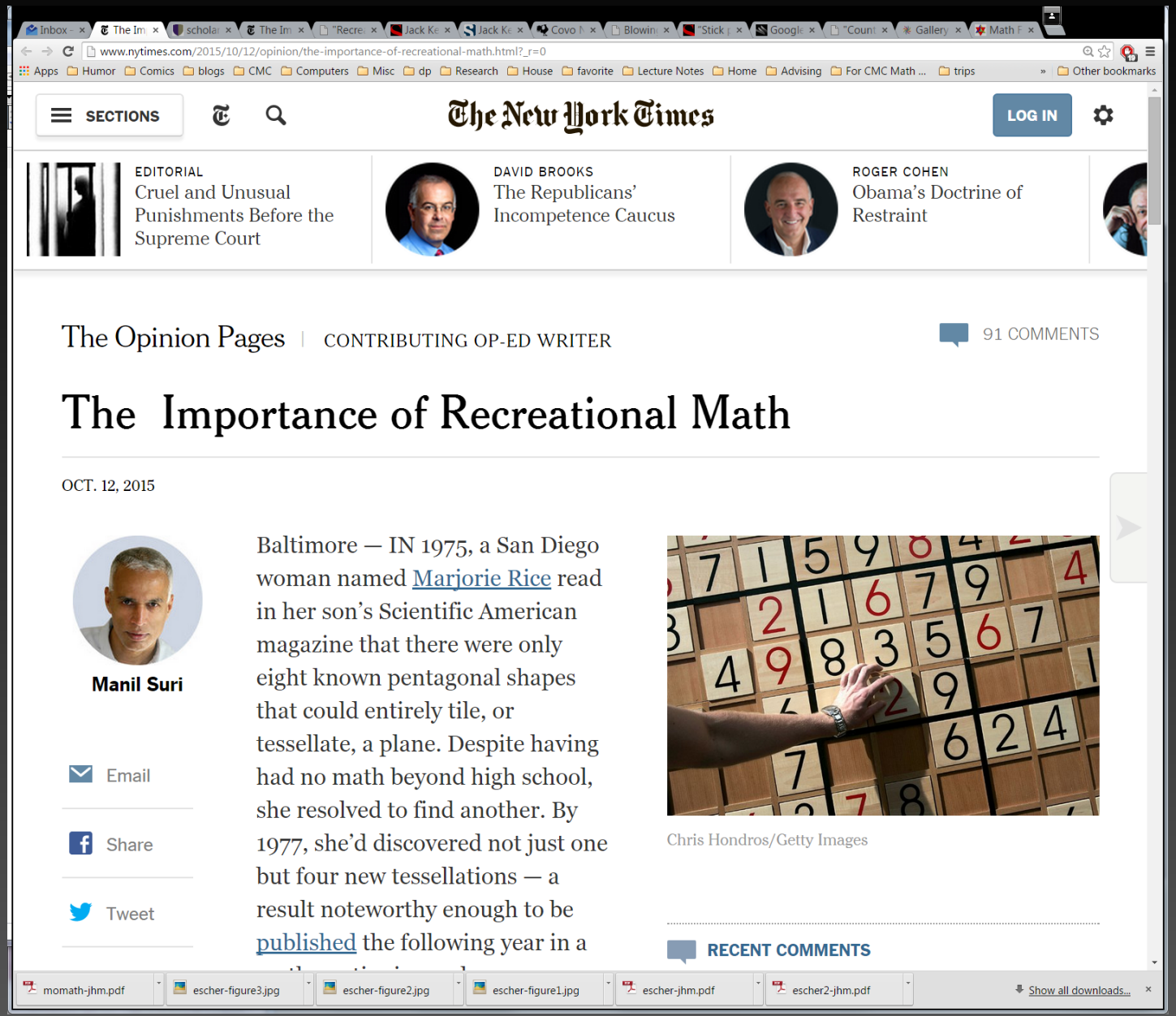
Using recreational mathematics



http://momath.org/gallery/

Recreational Mathematics

Recreational Mathematics—Only For Fun?

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Synopsis

In this paper, I explore recreational mathematics from two perspectives. I first study how the concept appears in educational policy documents such as standards, syllabi, and curricula from a selection of countries to see if and in what way recreational mathematics can play a part in school mathematics. I find that recreational mathematics can be a central part, as in the case of India, but also completely invisible, as in the standards from USA. In the second part of the report, I take an educational historical approach. I observe that throughout history, recreational mathematics has been an important tool for learning mathematics. Recreational mathematics is then both a way of bringing pleasure and a tool for learning mathematics. Can it also be a tool for social empowerment?

1. Introduction.

To do mathematics just for the pleasure of it is a popular activity; we find mathematical games such as sudoku and kakuro in newspapers and apps for our mobile phones. Doing mathematics for fun, otherwise called *recreational mathematics*, has a long history [30]. One of the oldest finds of written

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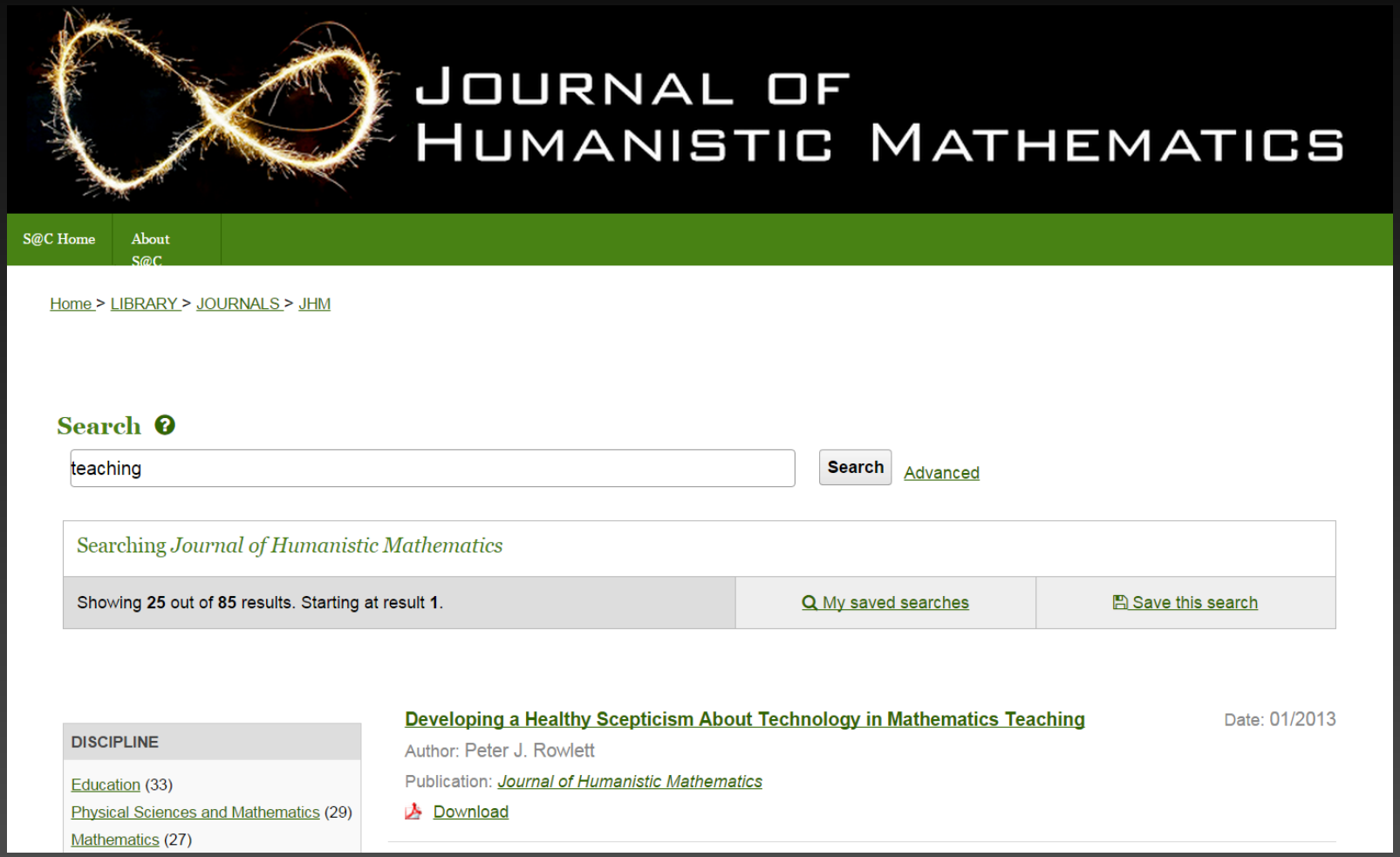
Teaching

Teaching and humanistic mathematics

Does a humanistic mathematical view impact teaching?

- Recognizing that mathematics is socially constructed can make sense of incongruities in mathematics
- Introducing creativity earlier into mathematical teaching
- Appreciation of the ``half-finished building''
- How does mathematics fit into larger societal concerns?
- Ongoing controversies/research in mathematics

Using recreational mathematics



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Schilling Kinematic Model

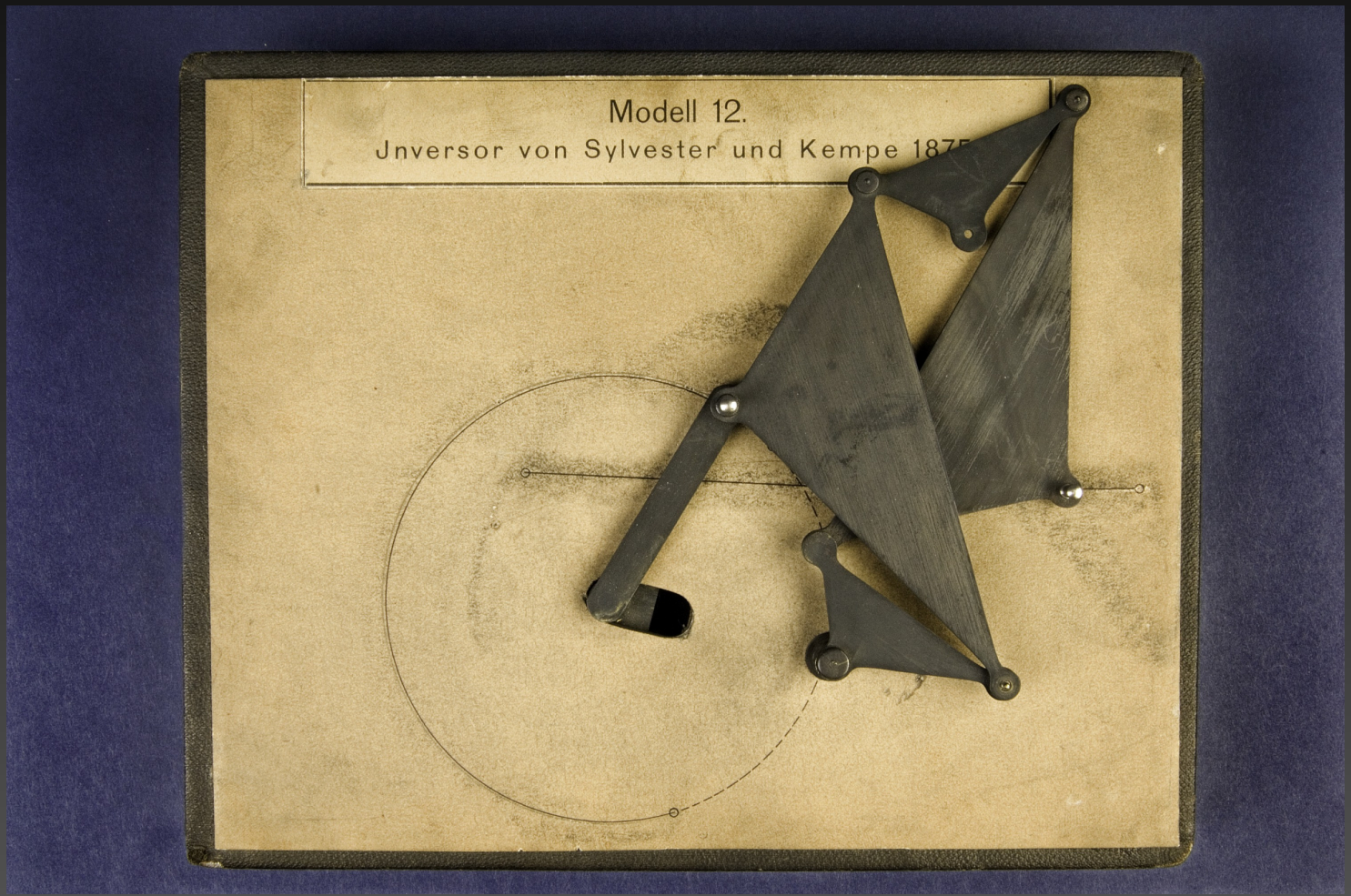
Teaching mathematics in 1900

- Used physical models to trace curves
- German firm Schilling created curves mechanically
- Example: linkages $=$ joined rods move around pivot points

Schilling Kinematic Model

Sylvester-Kempe Inversor

``Inverts'' circular motion back to straight line motion



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Schilling Kinematic Model

The Schilling Kinematic Models at the Smithsonian

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Synopsis
The kinematic models manufactured by the German firm of Martin Schilling were used in the late 19th and early 20th centuries to depict mathematical curves. The Smithsonian Institution owns twelve Schilling models. As a volunteer researcher in mathematics at the Smithsonian National Museum of American History, the author has chosen a few of her favorite models as an introduction to this interesting set of kinematic models.

In 2012, I moved to the Washington DC area. Move number 4 in ten years of marriage, that's what I get for marrying a career Army officer.

Before I even looked for a job, I contacted my colleague Peggy Kidwell, Curator of Mathematics at the Smithsonian's National Museum of American History (NMAH) to see if we could work together on a project. She confessed that she had no funding. I replied that I would be happy to volunteer, as long as I could have a Smithsonian nametag. So that is what I have!

http://scholarship.claremont.edu/jhm/vol5/iss1/9/

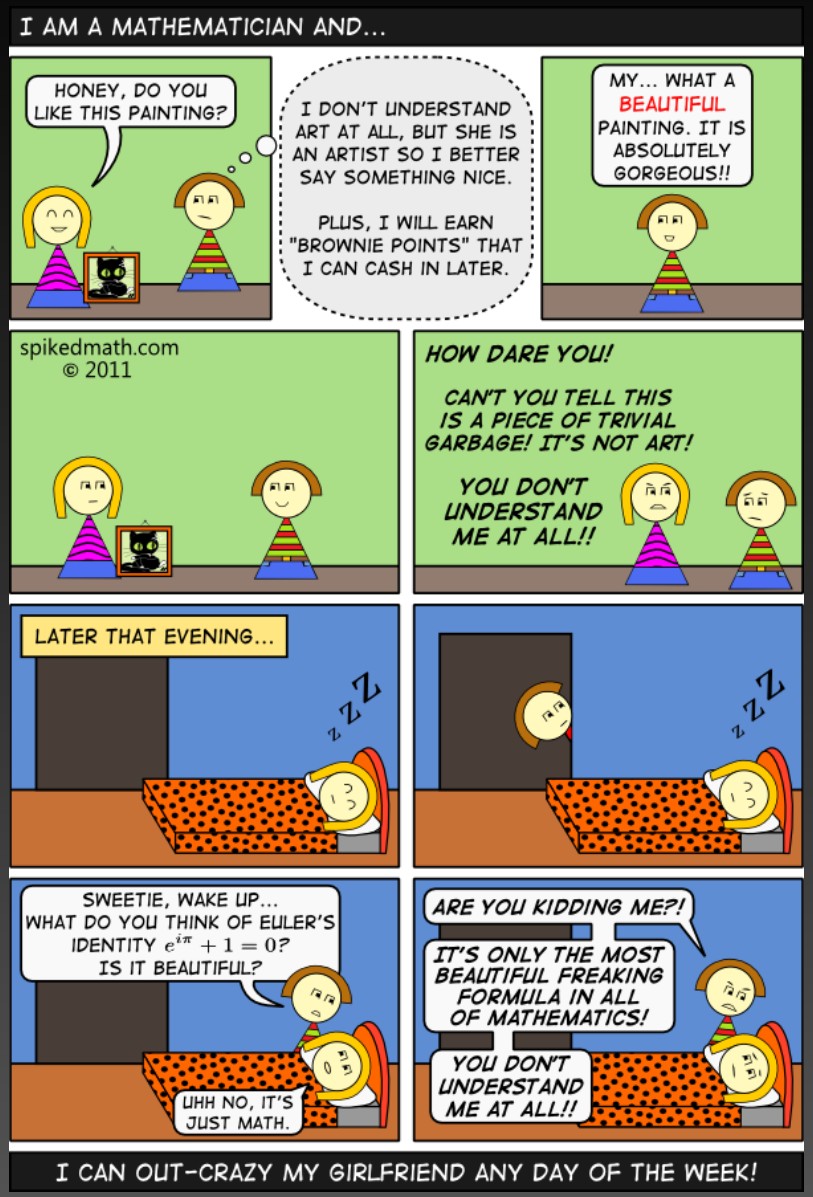
Beauty

Mathematicians on beauty

Mathematics, rightly viewed, possesses not only truth, but supreme beauty--a beauty cold and austere, like that of sculpture, without appeal to any part of our weaker nature, without the gorgeous trappings of painting or music, yet sublimely pure, and capable of a stern perfection such as only the greatest art can show.

Bertrand Russell, *A History of Western Philosophy*

Mathematicians on beauty



http://spikedmath.com/389.html