

ISSUE 110 SPRING 2012

the **PAPER**

The Magazine of OrigamiUSA

ERIK & MARTIN DEMAINE:

*Throwing Curves
at the Origami World*



**Teaching Geometry
through Paperfolding**
The Israeli Experience

Akira Yoshizawa
Honoring the Master

Thanks **GOOGLE!**

Curved Crease Sculpture

by Erik D. Demaine & Martin L. Demaine
Massachusetts Institute of Technology (MIT)

As you know, most origami is made from straight creases. Curved creases are relatively unexplored but offer a wealth of exciting geometric forms. Pioneers in the art include Josef Albers from the Bauhaus in the late 1920s and David Huffman and Ronald Resch starting in the 1970s. Albers, or one of his students at the Bauhaus, introduced the idea of pleat folding along concentric circular creases alternating mountain and valley with a circular hole in the center. Thoki Yenn called this model "Before the Big Bang." We call it a circular pleat or circular hyper. Perhaps most surprising about this model is how the paper "folds itself." By trying to stay bent at the creases and flat elsewhere, the paper relaxes into its natural equilibrium form approximating a saddle surface.

Our curved-crease sculpture explores extensions to this basic idea in particular by weaving together multiple circular pleats into a larger sculpture again letting the paper self-fold into its natural equilibrium state. Our most recent sculptures are

featured in a solo exhibition at the Guided by Invoices gallery in Chelsea, New York City, January–March 2012 (pictured). For more photographs of our work, see <http://erikdemaine.org/curved>.

Each series of our folded sculpture starts as a way to explore the mathematics of what's possible. In early experiments we use high-tech tools to try different crease patterns and foldings. We use a computer-controlled laser cutter or cutting plotter (similar to a Craft Robo) to score the paper, and then fold the paper by hand. For our final sculptures, though, we like to be fully hands-on and use only low-tech tools. We lay the paper on a plywood panel that has grooves in the wood. Then we use a ball burnisher to push the paper into the grooves. We occasionally manipulate the burnisher freehand but often use stencils or a compass to help guide our hand. The bulk of our time is then spent assembling multiple pieces into a single sculpture. After finishing a sculpture, we let it sit for a few days to let



Erik Demaine Martin Demaine
Photos of the artists by W. Zeichner

the paper fully relax into its final state. We then apply glue to critical joints to keep the pieces from shifting and to tolerate an accidental bump.

We like to use acid-free paper that is thicker to allow us to create larger free-standing forms. So far we've had the most success with two bonded pieces of Zander's Elephant Hide paper and with two bonded pieces of Mi-Teintes watercolor paper. This also allows us to make paper that is two-toned.

Sometimes we know our goal ahead of time, and other times we simply play and explore. One recent experimental approach has been improv folding. Improv is a form of theater that actors make up as they go. One person says or does something, and the next person always accepts and builds on it, with never a complaint. This approach is called "Yes And." We take this approach to sculpture, and it leads us into new unexpected territory. Erik will add a piece or two, and then it is Martin's turn to add pieces, and then it goes back to Erik, etc. By always accepting the last addition, we reach assemblies that we never would have individually. We highly recommend this form of collaboration. ♪

Erik & Martin Demaine

THROWING CURVES AT THE ORIGAMI WORLD

by Chris Byrne* (TX)

I first encountered Erik and Martin Demaine's work in Vanessa Gould's 2008 documentary *Between the Folds*. Around this time I also became aware of New York's Museum of Modern Art's exhibition entitled *Design and the Elastic Mind*, which included examples from the Demaines' *Combining Curves* Series.

Upon seeing their work, I was immediately struck by the juxtaposition of origami craft with the programmatic approach of each composition and related series. The obvious formal similarities to the work of Tony Cragg, Frank Stella and Frank Gehry—the latter, coincidentally, designed the building that houses the Demaines' offices in Cambridge, Massachusetts—initially came to mind. But unlike these three with their heavy, fabricated and foundry-dependent objects, it was possible to perceive the Demaines' playful and imaginative approach stemming from their fascination with mathematics, games and puzzles. Plus, it was literally as light as the paper they used.

During my preparation for their New York exhibition at Guided by Invoices (a new gallery in Chelsea), I had the opportunity to visit the studio on the Massachusetts Institute of Technology campus and was surprised to find a workplace of intuition—a trial and error laboratory. In retrospect,

I'm not sure what I was anticipating instead—perhaps something more clinical and factory-like. Following this revelation, I began to consider their output as akin to the manifested utopias of Buckminster Fuller, ultimately rendering issues of style or medium irrelevant (Martin is also a recognized glass artist).

A keen personal interest of mine is the genre known as "Outsider Art," created by the self-taught. In this realm, the artists' idiosyncratic creations arise from a primary need for personal expression. The terms "Contemporary Artist" and "Outsider Artist" were invented to designate the makers of seemingly disparate objects, but many contradictions as well as a great deal of overlap exist within these predetermined categories—countless recognized artists are self-taught, and outsider artists often create within a community.

It may initially seem disingenuous to include the Demaines among this latter group (Erik is the youngest tenured professor in the history of MIT and in 2003 he was awarded a MacArthur Fellowship). However, what I'd like to propose is not that their work is unsophisticated or naïve, but that it is created "outside" of the accepted conventions and canons of the contemporary art world and marketplace. The physical object

or event becomes the byproduct of their need to search, discover and manifest their ideas into the folded paper. It's this inquisitiveness and purposefulness that separates them from an art-making practice derived from clichés involving novelty and commodification. Accordingly, Erik has stated that his artistic endeavors provide deeper insights into the underlying mathematics and that these physically realized objects indicate future directions to explore and reveal new problems to solve.

This innate urge to create images, objects and environments dwells within many of us, and the impulse to get that inner voice out into the world—using whatever materials are at hand—is the self-imposed task of the artist. Through the Demaines' work, I believe it's possible that makers and viewers can share a common imaginative bond and engage in all creative areas equally. It's been a great privilege and honor to work with them.

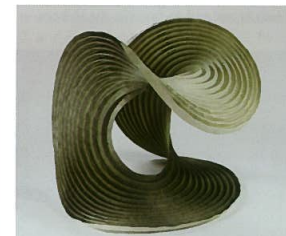
**Chris Byrne is an independent curator, former chairman of board of the American Visionary Art Museum and co-founder of the Dallas Art Fair. He currently serves on the board of directors at the Dallas Contemporary. For more information on this exhibition, visit the website www.guidedbyinvoices.us*



Opening day at Guided by Invoices gallery in New York City (01/19/2012).
Photo by David Wang-Iverson.



Elephant hide paper, 8" x 9" x 9" high (2012)



Elephant hide paper, 12" x 13" x 12" high (2011)



Part of "Watercolor Series". Mi-Teintes watercolor paper, 16" x 23" x 16" high (2012)

Sculpture pictures by Erik Demaine & Martin Demaine, 2012.