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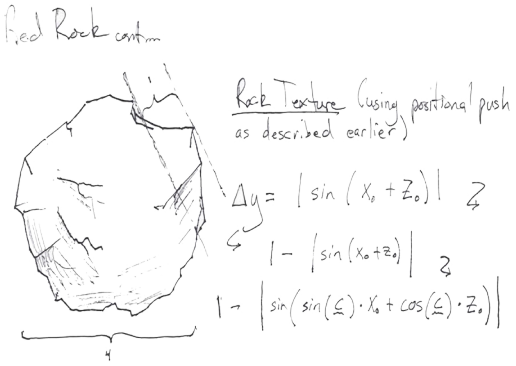
CCAI is delighted to present An Algebraic Lens*, a solo exhibition by artist Ben Hoffman at the CCAI Courthouse Gallery from September 20, 2013 – January 23, 2014. In conjunction with the exhibition, CCAI commissioned artist and writer Chris Lanier to write the following essay. CCAI extends its sincere appreciations to Ben, Chris, the Carson City Courthouse, and all those involved in the exhibition.*

Ben Hoffman: AN ENDLESSLY ELEGANT PLAYGROUND

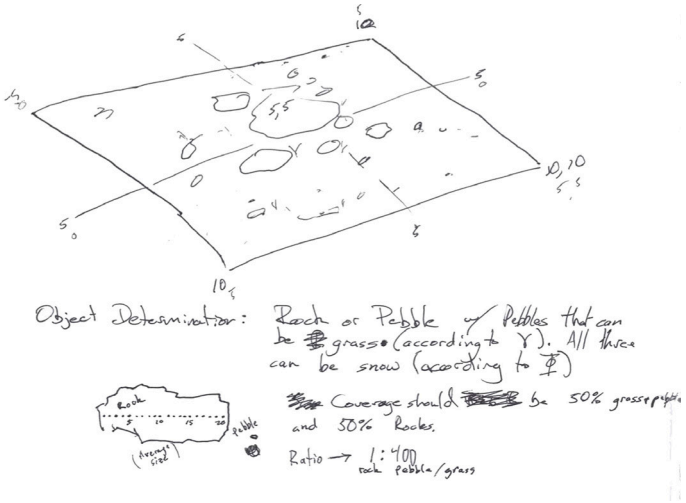
A VISUAL PLACE

Ben Hoffman's artwork is concerned with making Math visible. Math, of course, is visible all around us, if we are trained to look for it. It is embedded in the structural architecture of our environment, whether man-made or natural – and embedded in our own bodies, encoded in the symmetries and patterns that form and define us. Hoffman is particularly aware of the mathematical underpinnings of the visual world: "I'll see something in nature that I recognize, a structure that reminds me of a mathematical



structure – it's most typically a curve. I've always been mathematical, and love to break down the technical structure of things." He went to school to study Math Modeling, which can be a very abstract exercise, but thinking in terms of images helped him solve mathematical problems – for instance, a problem modeling control valves in a hydraulic tank system. "Math modeling is rarely very visual – you're after certain numbers. What is the perfect time for me to open a valve in order for various volumes to be maximized? I always wanted to visualize, for instance, the tanks in the valve problem – that's where math lives for me, in a visual place."

Hoffman is interested in the traverse between the physical and the mathematical, and the prints on display show immediately recognizable physical forms: a stand of trees, a jellyfish, a cluster of flowers, a whorled shell. The forms sit isolated in blank space, the way the authoritative black marks of an equation normally sit in a comfortable expanse of blank white paper. Clarity is of utmost importance – what we are looking at is a series of mathematical equations that have been given a visible dimension. While we see a jellyfish, or a shell, or a flower, there is an element of trompe l'oeil here that goes beyond normal tricks of representation, where we accept marks on paper as descriptions of objects with weight and dimensionality. These objects have not been drawn or sculpted in the traditional manner – they have been brought into being by calculation. In a certain sense, these prints are abstract art, disguised in the clothes of figuration.



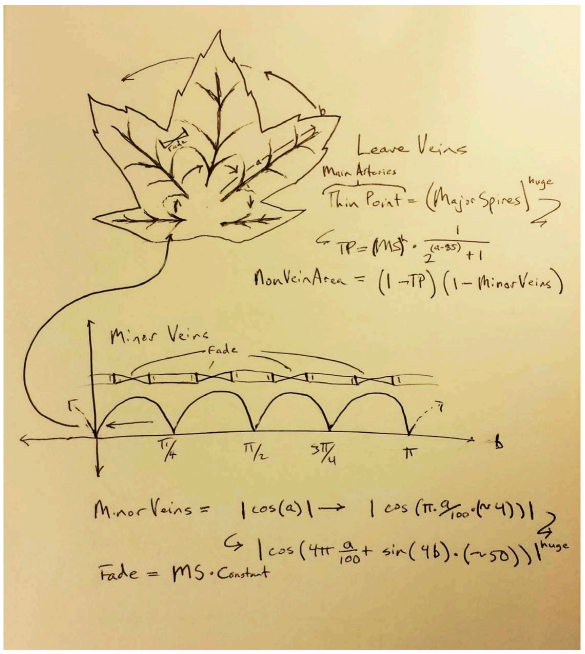
BACKGROUND CALCULATIONS

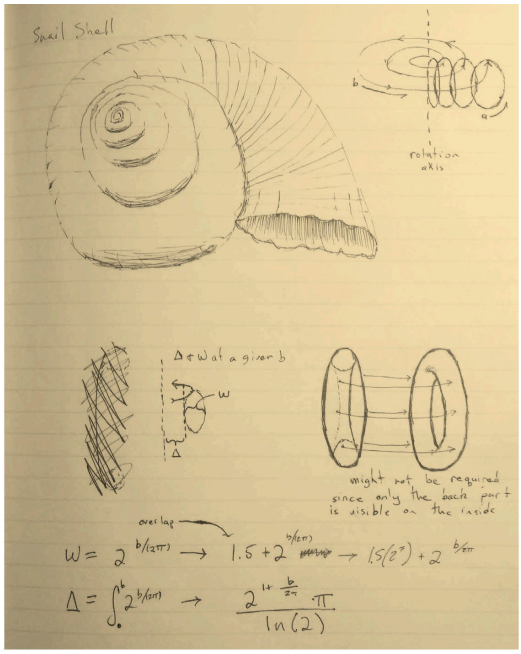
The notations that are incorporated into his prints are intended to give the audience a peek behind the curtain of his process. Hoffman has a notebook that is filled with combinations of sketches and equations – a place to capture his ideas and work them out. Hoffman scans portions of this notebook to integrate into his finalized images, as a sort of footnote or sidebar. To someone who isn't fluent in mathematics, like myself, these notes form a kind of tantalizing ornamentation – I know the equations provide a roadmap to the image, even if I can't get there myself. At a previous show of his work at the Nevada Museum of Art, some gallery-goers were mathematically literate, and engaged with Hoffman in some back-and-forth over the notations: "We'd have a 20-minute conversation based on a couple curves. I nerd out pretty good with this stuff."

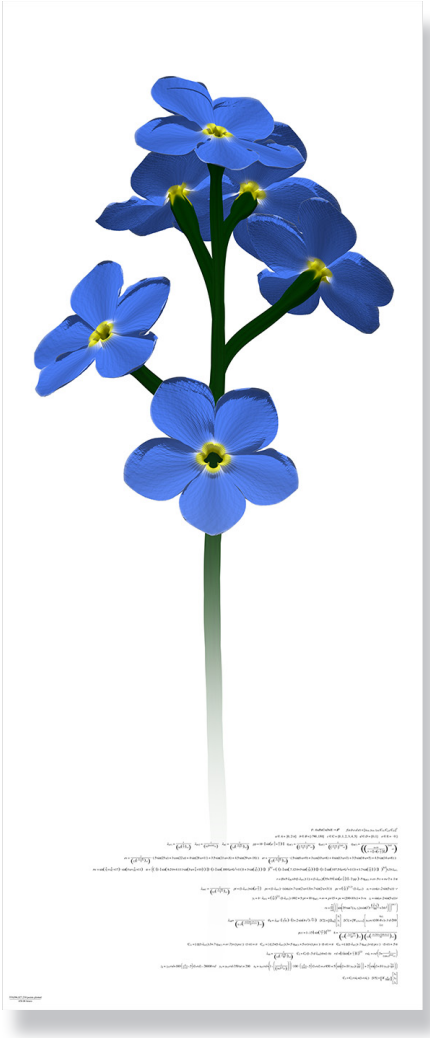
While the world of computer graphics has produced a variety of software to model forms in virtual space, Hoffman doesn't use any of it for his art – he runs his calculations in C++, a popular programming language, using his own custom code. "Programs like MathCAD or Maple could be used, but I'm working at a very high resolution, beyond what they're designed to do. With custom code, I can also target the specific things I want – I customize to optimize. The calculations can run much faster."

Despite the optimization, the calculations that result in the finished artwork can take quite a while. When I met with Hoffman to look at drafts of his artwork in Photoshop, he hid the Photoshop windows and opened up another window, showing a calculation in progress. "I'm always running the calculations in the background on my laptop. Some have taken as long as 20 days to finish. I have to break some calculations up, or else I end up in a situation where I can't turn off my computer – or crash it – for 20 days."

The calculations are only set into motion once Hoffman has thoroughly worked over his concept on paper. "I never go to C++ and just start entering equations, unless I have a grasp of the whole structure. I take my plans as far as I can, here in the notebook, before I plug it into the computer."





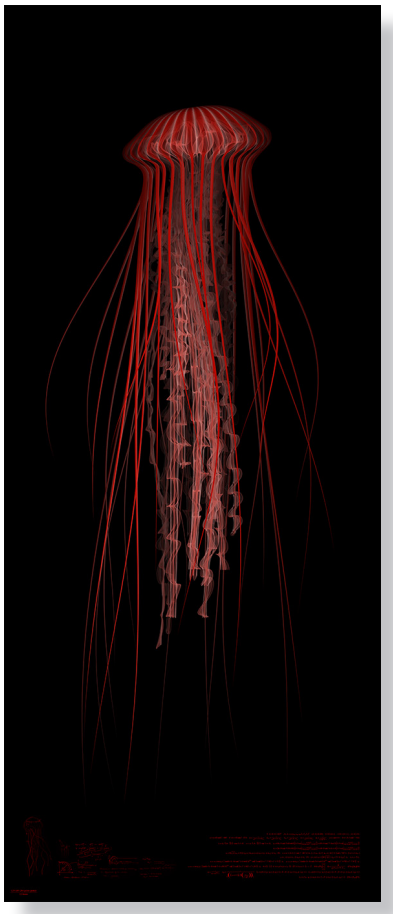


IN THE "BETWEEN"

Sometimes the principles he explores are not necessarily the obvious ones. For instance the spiral shell he depicts in *Shell*, a form that is relentlessly pressed into service as an icon of the Golden Ratio, actually arose from a different area of interest – the phenomenon of ambient occlusion, where a surface becomes darker at the point where it touches either itself or another surface. His *Jellyfish* print emerged from looking at density modeling: "There are certain models where you get to see density and translucency – and they look like deep ocean creatures. A jellyfish is very mathematical – it flows right out of the math."

Developing figurative forms through mathematical modeling allows him to connect objects that are otherwise distant from each other in environmental or functional terms. It becomes natural to group *Jellyfish* with *Forget-Me-Not*, a cluster of flowers. "With the blue forget-me-not flower, the edge of the flower has this sinusoidal superpositional quality that you see in the core of a jellyfish. They have structural analogies that bring them together. It's mathematical stream-of-consciousness – you can get from point A to point B really quickly. I find a lot of joy in the 'between.'"

Since Math provides Hoffman with an endlessly elegant playground – offering bridges between a vast array of things both tangible and intangible – I asked him what he thinks Math actually is. I was a little surprised at the limits he placed around his definition: "Math is our understanding of the universe. It's our way of getting at the rules that define things. It's just our way, but it's the best thing we have. I assume there are things we don't understand. It's the best we can do – but it is nice to see how well our models can predict things and describe things."



His definition – rooting Math in human understanding of the world, but stopping short of claiming Math as the world itself – speaks to his motivations. The finished work is not a foregone conclusion, an inevitable expression of an ironclad axiom. It is less lecture than investigation: "Every time I make a piece I'm surprised by one aspect or another. I put in a basic structure, and then I'm always surprised by some element of it. All of these curves, when you put them together, create another effect. And then you ask: how can that be enhanced? You combine basic ideas, and it always produces more than the technical and mathematical principles you put into it. I'm always chasing that. I like to see complexity produced from simplicity."

AN IMPLICIT FOREST

His piece *Only Leaves* might mark the beginnings of a new avenue for his work. At first glance, it looks like a stand of trees – but on closer inspection, the furred trunks of the trees reveal themselves to be made up entirely of leaves – as if a conglomeration of leaves has decided to impersonate a tree – or as if the underlying superstructure of the tree has been deleted, leaving the leaves to their own devices to fill in the gaps. Hoffman is remaining true to a natural form, but tweaking the details. The piece developed from Hoffman questioning his own visual perception of trees – and understanding how much of a tree, when presented to the eye, is implicit.

"I've always had this thought, when you look at a forest, or a tree – what you're looking at is leaves – thats all you're looking at, really. I wondered – logically, what am I looking at, and what is it I'm really seeing here?" *Only Leaves*, as the title implies, is an exercise in describing a tree with the branches and trunk removed. In his original conception, he imagined the plumes of the trees floating above a ground layer of leaves. But after rendering a few of his ideas along these lines, he thought more about the link between the plume and the ground – there was a connection between them, he just wasn't making it visible in his renderings. "I needed to get the leaves from the plume to the ground. Mathematically there's a relation to the plume and the ground – it's going to happen along an axis anyway. Naturally the path was along a straight line down. The leaves that form the trunk are just revealing what was there. I essentially turned the trunk on. It's absolutely defined, but less literal – playing with the model. That's an example of an evolution – a feedback loop between the aesthetics and the math. The math is informing you along the way."

Hoffman's modest forest – each tree parceled out evenly in an open white space, cultivated as carefully as any demonstration garden – occupies a very intriguing space. It is a place where description becomes invention – and where aesthetic decisions and mathematical decisions can't be prised apart.

Chris Lanier
Reno
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