

Ouroborum: Transfiguration of the Labyrinth

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Abstract

Embracing the archetype of the labyrinth in both form and concept, the work presented functions as an artistic exploration of the landscape between opposites such as interior / exterior; personal / universal; logical / emotional; matter / space. This project is a labyrinth. This text and presentation are also labyrinthine.

Departing from the drawing technique he calls Labyrinthine Projection, the author details his process and the background influences behind the work. The work generally does not represent the typical or classic labyrinth model, though clearly labyrinthine in nature. But like the labyrinth, this work is formulaic because it subscribes to a very rigid set of constraints. Unlike the labyrinth, the work functions best through its meandering rather than a prescribed form. It is an aesthetic that can change character as a function of the viewer's proximity to the work, or when employed as form versus decoration.

This graduate level exploration culminates in an installation of three works. Each finished work was chosen for its representative quality of either art, craft, or design. The installation as a whole represents any successful creative endeavor which must satisfactorily unify these three modes. I consider these modes as indispensable and integral components to the full creative expression, just as the Ouroboros has a head, tail and body.

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Project Statement

Departing from flat, unicursal, hand-drawn labyrinth images, the project is an exploration in extending the technique into sculptural objects, installation, and experiential time-based works. The unicursal labyrinth technique comes pre-programmed with a rigid constraint system. The challenge of this project is to take the work into higher dimensional expressions while maintaining the defining characteristics of the Labyrinthine Projection; which are, continuous, unicursal, non-intersecting.

In contrast to a set of rigid constraints that define my technique, the discovery process is intended to indulge my curiosity by meandering through various materials, processes, and scales. Materials including metal, wax, resin, and acrylic will be employed experimentally using processes including welding, milling, electroforming and hand-work. The work will culminate in an installation of objects representing various aspects of making including art, craft and design.

Background Influences

Extending from countless hours of my childhood spent creating patterns on the infamous Etch-A-Sketch toy is the *Labyrinthine Projection* (LP) defined as, “a single, uninterrupted, non-intersecting, hand-wrought line of constant weight that resolves to a photo-like image.”¹ The process of creating the LP began intuitively as a skill-building exercise of drawing a continuous, rectilinear line constrained to maintained a constant distance from itself as it meandered randomly over the toy’s screen-like surface. Later, the activity extended beyond the Etch-A-Sketch as a hand-drawn, space-filling doodle of pen or pencil (see fig. 1). Though I was not aware of it at the time, the practice was inseparable from what would later be identified as a self-soothing practice like that associated with mediation or the repetitious reciting of a mantra in prayer-related practices.

This essay will describe my creative practice related to the Labyrinthine Projection; my current investigations of moving from two-dimensional drawings to three and four-dimensional sculptural extensions of the technique; the context for understanding the relevance of this work in the contemporary setting; and an overview of where I would like to take this work going forward. It should be stressed that the work being produced for this practicum is not intended to be any specific object or experience, rather the work is an ongoing investigation

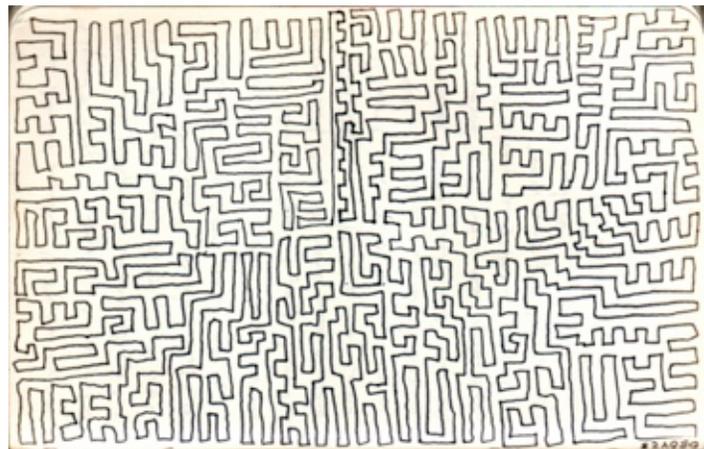


Figure 1. 020930 labyrinth doodle drawing by author.

¹ http://en.wikipedia.org/wiki/Labyrinthine_projection

into the myriad of expressions made possible by a *unicursal* aesthetic. Additionally, the work investigates some possible creative solutions to evolutionary applications of the technique that satisfy the constraints of the Labyrinthine Projection. The goal is to explore artistically fractionally-dimensional perspectives I call *transdimensional*, then apply the discoveries to highly crafted object/experiences designed to engage the viewer at a profound level, as in subconsciously or spiritually.

A note about the term *transdimensional*: Outside of science fiction literature referencing extraterrestrial beings, and a narrow field of physics called, “transdimensional unified field theory,” which attempts to unify theories of relativity with quantum mechanics, transdimensional is a term never before used to describe a characteristic of art, craft or design. It is my aim, beginning with this essay, to establish the use of this term as applied to a very specific set of criteria in visual art and design. Transdimensionality will be described more fully later in the essay.

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My interest in the labyrinth aesthetic is an extension, and symbolic representation, of my fundamental belief in the interconnectedness of all things in the universe. I have no memory of being formally taught or introduced to that idea. But one day in 2005, when writing an artist statement about my labyrinth work, from somewhere deep inside as though the idea had been in my heart from day one, those words just rolled off my mind through my fingers onto the typed page.

In spite of its apparent banality, it made perfect sense. A few years earlier I had begun to experience migraine headaches with accompanying strange, almost hallucinatory visions. As I observed the world around me during these episodes, the landscape, and every element of it down to the tiniest grain of sand, was covered with one living,

breathing, intelligently flowing membrane. I literally perceived the boundary layer between object and space, between matter and energy. That boundary layer is an impossibly thin membrane existing in a fractionally dimensional space: neither object nor the space around the object. Somehow during those migraine episodes I could perceive it. And it transformed my relationship with the world around me.

I have no memory of the first time I took notice or learned of labyrinths, I've just always been drawing unicursal curves ². As touched-on above, labyrinth-making for me began as a form of doodle-drawing that I later realized served for decades as a meditative, self-soothing exercise. When faced with a difficult psychological challenge in 1997, I associated the rhythmic, endlessly meandering line with being lost. At that time I began

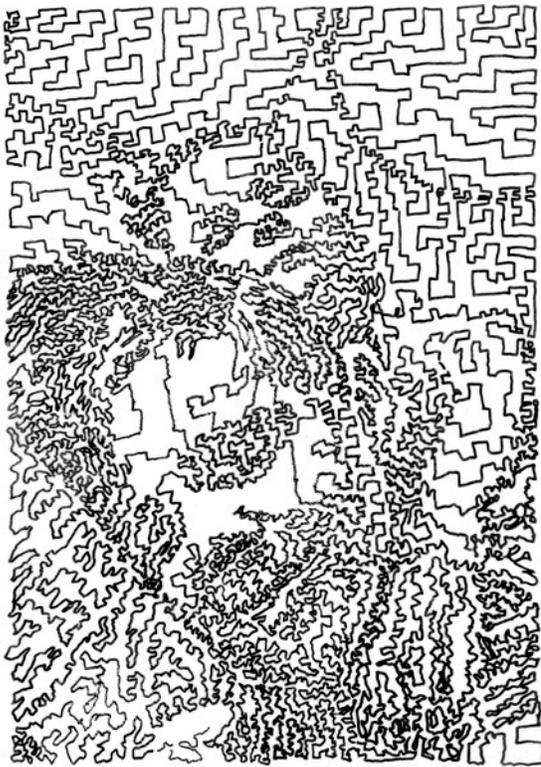


Figure 2. Author's *Digi Pals*. Early Labyrinthine Projection ca. 2000.



Figure 3. Same image with Photoshop blur filter.

² In simple terms, *unicursal* references a specific condition of a mathematical curve (line) that does not cross itself at any point in the expression.

referring to the drawings as labyrinths and wrote of feeling trapped in an endless manifold of despair. I began to create the forms obsessively. It was around the same time I began to develop the aesthetic into the photo-like image which I later termed, the Labyrinthine Projection, now a trademark (see figs. 2 & 3).

The term was coined to describe a *labyrinthine* line that, if made of wire, would project a shadow from a single light source onto a parallel plane behind the wire form. This effect was simulated using digital manipulation to blur the image (see fig. 3), thereby blending the individual lines segments into a wash of tone. One thing I find endlessly fascinating when observing my audience engage it is the work's power to affect the viewer. Intuitively, people adjust their physical relationship to the work so as to find the perfect "sweet spot" from which to view it. I will elaborate on the audience later in this essay. For now, suffice to say, the work clearly demonstrates a potential to actively engage the audience, a facet of the work I find particularly rich for exploration.

The unicursal aesthetic is of particular interest to me for several reasons. Primarily, the rhythmic pattern of the labyrinthine path is quite engaging. When creating these images, I am very aware of the line as evidence of an intuitively driven, rhythmic action (see fig. 4). Though my process has many analytical components (such as active perception, analysis, and comparison) occurring simultaneously that inform the final output, the act of mark-making for me is primarily driven by an active, intuitive, almost musical force. In fact, often in the process, the

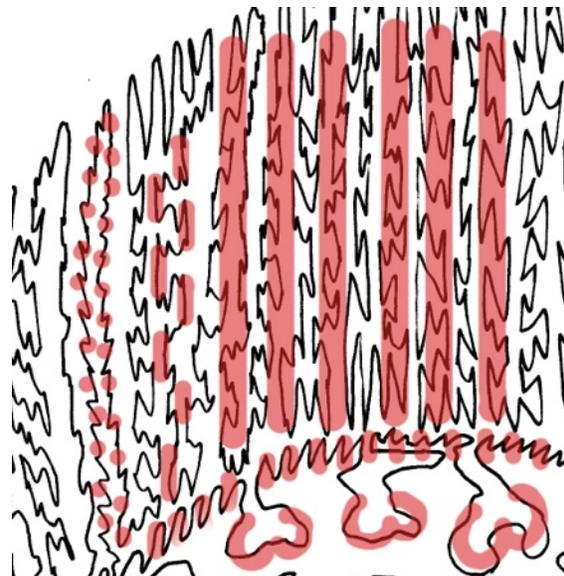


Figure 4. Some rhythms found in an LP drawing.

line is a visual accompaniment to a musical performance in my mind where I hear the rushes, and swells, of symphonic passages similar in aesthetic to the compositions of the Romantic composers such as Ravel and Debussy.

The line demonstrates many, if not all the characteristics and flourishes of a musical composition including meter, tempo, tone, mood, and modulated intensity through crescendo and decrescendo. The crafting and experiencing of both orchestral music compositions and my line work are not just linear, but unidirectional. Thus, when I look at a labyrinth drawing, I can re-experience the musicality of it similar to, though not as specific as, a musical score.

I am interested in the unicursal aesthetic for its cartographical quality. The lines resemble those found in topographical maps (see figs. 5 & 6), but also suggest a path. Therefore, my labyrinth line is an abstraction of the path one might walk over the landscape. When creating my labyrinth lines, I imagine hovering over a hiker on a back-country wilderness trail. It is a very powerful perspective, not only to be watching, but directing from high above. But more important for me is the association between the act of drawing and the act of back-packing. Mentally, they become interchangeable.



Figure 5. Detail of LP drawing.

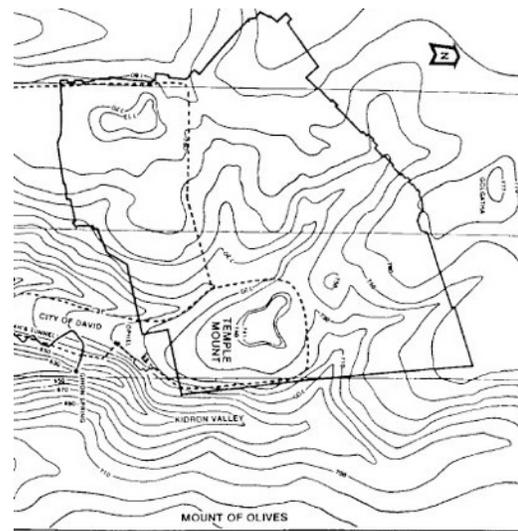


Figure 6. Detail of topographical map.

While creating a labyrinth drawing, I can re-experience the feelings of peace and calmness that I get when backpacking simply by imagining that it is me I am observing walking the path I am creating for my “other” self who is “down there” back-packing. This has the collateral benefit of reinforcing the idea that I am an active agent in my own life path.

In his experiments recording the brain activity of people walking labyrinth patterns, researcher Stephen Bosbach reports measurable shifts in the dominant brain-wave activity from left to right hemisphere as measured by electroencephalograms (EEGs) of test subjects before and after walking the sixty foot Levi labyrinth in Austin, Texas.³ His study helps establish that when following a path that demands no decision-making, there is a decrease in left hemisphere brain activity resulting in a dominance of right hemisphere activity. The right hemisphere is where we predominantly process emotions, imagination, and feelings, thus the increased right hemisphere activity associated with following a labyrinth path is conducive to creating a more emotional and or imaginative mind-state. This might account for the association labyrinths have with emotional, psychological, and spiritual exploration and why I gravitate toward imaginative visualization, such as hovering over a backpacker, when executing a labyrinth drawing. In essence, my lines are unrepeatabe, seismographic transcriptions of intuitive mental activity, stylistically different from, but practically equivalent to an EEG.

While creating works from a labyrinth line, whether using a pen on paper, a mouse-driven cursor on the computer screen, or over a three-dimensional surface with a power-tool, an intense and sustained concentration is required. David Pye’s *workmanship of risk* is recalled, where the results of an action are not predetermined and can at any time

³ Bosbach, Stephen. “Mind Mirror Measurements At the Levi Labyrinth”. *Mid-Atlantic Geomancy*, 12. 1998. Print.

render the work ruined. Thus, the stakes are set, the pressure is on and would seem inherently not relaxing – but it somehow is.

The process requires decisions to be made regularly, though not constantly. This is an important observational detail, for it suggests that there is a back and forth between an analytical decision making, and a decision-free, cognitive state. I am simultaneously processing many analytical decision-making processes to create the line while following the path visually. As I observe the point of contact of the tool to the material (see fig. 7)

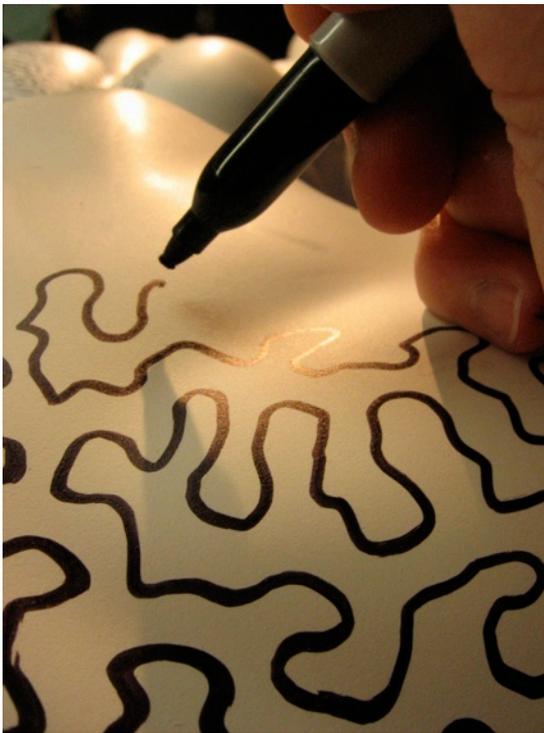


Figure 7. In process labyrinth drawing.

and follow its development, my left-hemisphere is working on a timeline from the present toward the future in order to determine the correct path.

Simultaneously, my right hemisphere is observing a timeline from the present back to the past in order to determine proximity.

As I am aware of rhythmically traversing back and forth between these hemispherically discrete activities, I wonder if this metronomic mental activity is

responsible for the indescribable feeling of

nothingness that envelopes me. I experience pulsations of immateriality which feels like a resonant connection to something beyond myself - a connection, perhaps, to that expansive membrane that visually accompanied my migraine headaches.

In summary, the form of the line is directed intuitively in real time, punctuated by brief instances of feedback from an analytical voice which ensures compliance to the constraints that define the LP. The mental space I occupy while executing an LP work is

one of serenity and timelessness. It is my goal to create works which embody these characteristics and maybe even activate the potential in my viewer to feel them himself.

Beyond my personal interest in the unicursal aesthetic is the innate connection to this visual form. Most any line represents, artistically and perceptually, an edge. The edge is a boundary, often indicating where planes connect or overlap. Our mammalian visual cognition uses the line to determine form by delineating between positive and negative space. So when a line creates an ambiguous form with an interchangeable relationship to positive and negative space, we are perplexed at a deeply physiological level (see fig. 8).



Figure 8. Ambiguity of negative and positive space of the LP's implied surface.

Further, perception research shows that we are pre-configured to engage this type of visual experience in an attempt to ascertain any potential threat.⁴ I believe this may be a factor in what intrigues people about this work. University of Toronto advanced graphics professor, Karan Singh, agrees: “Our visual system is trained to pick up edges and also edge crossings. Thus an image devoid of edge crossings [has] a certain visual appeal. That is part of the appeal also in your . . . [unicursal] hand-drawn labyrinths.”⁵

⁴ Field, David J., Anthony Hayes, Robert F. Hess. “Contour Integration by the Human Visual System: Evidence for a Local ‘Association Field’”. *Vision Research*. vol. 33. no. 2. 1993. 173-193. Print.

⁵ Singh, Karan, PhD. Message to the author. 2 December, 2010. Email.

I believe the marks approach a universal appeal because they suggest a certain understanding or a sympathy with nature. Here, Pye's notion of *free workmanship* comes to mind. Free workmanship exists in the space between *workmanship of risk* wherein the resultant quality of a manual process is not pre-determined and *workmanship of certainty* wherein the quality of the outcome of machine process is well known in advance. Pye observed countless examples in nature in which a form is repeated, yet each iteration of that form simultaneously exhibits individual variation. An example is the leaf. The leaves of an oak tree are identical to each other, yet distinct from leaves of another variety, such as an aspen. As nature creates each individual iteration of the overall design of the oak leaf, minor variations of the form give each leaf an observable uniqueness.

In craft theory, *free workmanship* accounts for this duality when a craftsperson creates multiple iterations of an object. Though generally alike, each will embody unique marks or affectations that give it an individual character while still conforming to the overall

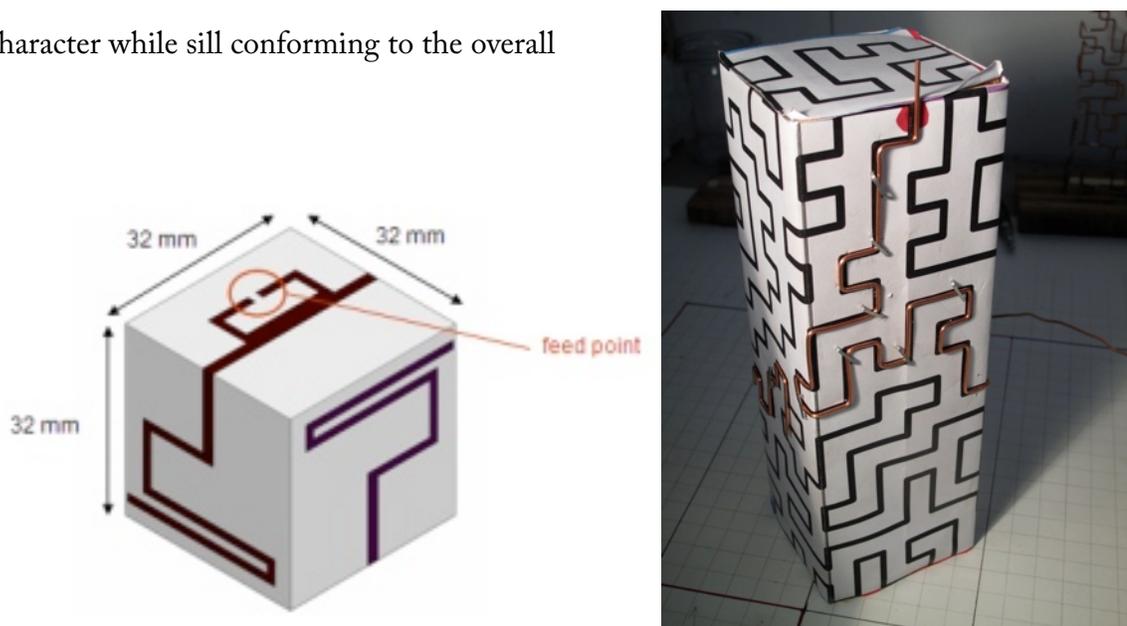


Figure 9. NASA RFID Hilbert antenna illustration (left) ([image: Georgia Institute of Technology](#)) and the author's recent sculptural explorations (right).

design. Pye writes, “Thus, in free workmanship we see the natural order reflected in the works of man.” (30) In this vein, each LP iteration is both unique while maintaining integrity with the over-arching definitive characteristics of the LP.

I like the idea that I might be intuitively responding to universal precedents all around when crafting my labyrinth designs. It brings to mind the concept of sympathetic resonance, a very powerful natural phenomenon in which vibrations from one source can cause another object to resonate sympathetically under the right conditions. Besides sound and music, the entirety of electrical power generation and telecommunications is based on resonant frequencies. In technology, current Radio Frequency Identification (RFID) technology uses antennas which appear to be directly related to my recent explorations in labyrinth drawings and wire sculptures (see fig. 9).

My work has always privileged the intimate. It is my intention to draw the audience close to the work; sometimes directly through the subject as in portraiture or the nude figure, other times through the use of small scale to physically draw a viewer into a work. Small scale effectively collapses the distance between the work and viewer. Another way I achieve this is through the practice I term, “rewarding the engaged viewer.” I believe that if I’m going to ask my audience to take my work seriously, I have an obligation to make the experience meaningful beyond its consumptive value.

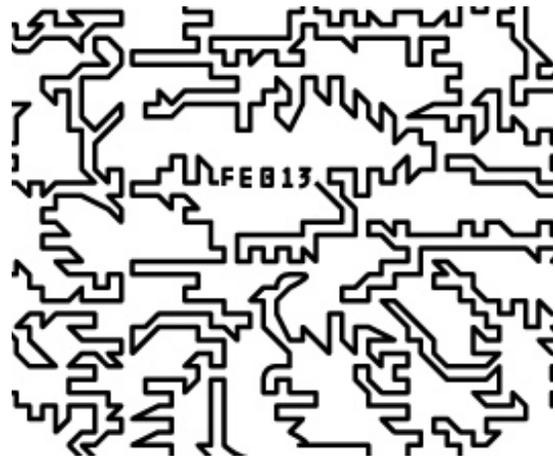


Figure 10. “Easter Egg” imbedded in labyrinth drawing [FEB 13].

A specific method I use to encourage appreciation over consumption is by embedding “easter eggs” in the composition (see fig. 10). Words are strategically

imbedded in the shape of the line giving the work another level to be engaged. Rarely can these treats be pointed out without at least a cursory tracing of the mark.

Consistently, when a viewer notices one, she will immediately begin tracing the entire mark in an effort to find all the hidden treasures.

An important aspect of creating these works is that I approach designing them from both the physical and virtual environments. Constructing models with my hands from various materials, including wax, wire, acrylic resin, and electroformed metals, is complimented with the creation of digital models in the virtual space of 3D software such as *Maya*, *Rhino*, and *SketchUp* (see figs. 11 & 12). Employing these digital tools, the tools

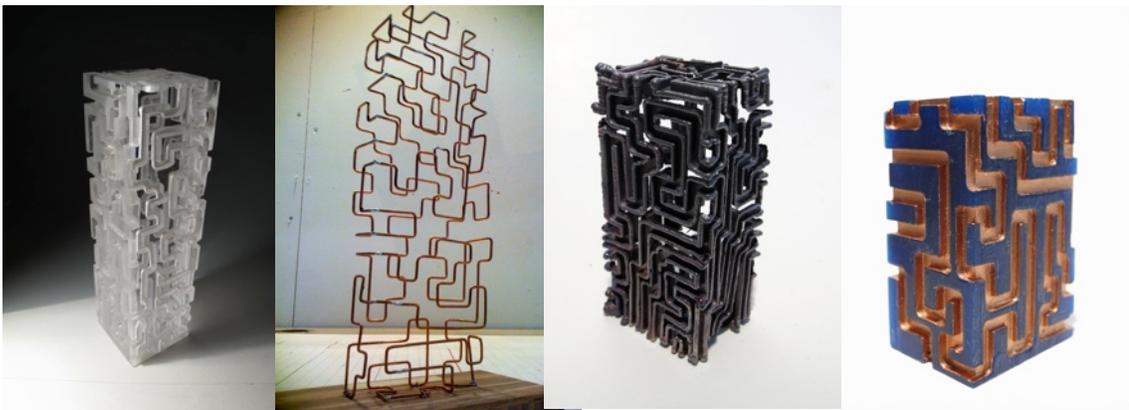


Figure 11. (L to R) Material explorations in acrylic, copper wire, electroformed copper, painted wax.

of my time, informs the idea, materiality, and craft process of the works. In other words, this dual approach, analog plus digital if you will, stand as the poles of a dialectic bounding a continuum wherein the art, design, and craft of my work are infused.

Technology and contemporary tools, processes, and materials have always played an important role in my work.

From a materials perspective, I have really enjoyed working with wood, wax, and acrylic milled with a manually operated, three-axis milling machine with 0.125 inch and 0.250 inch mill-ends. Some of the wax pieces are electro-formed to create a copper

labyrinth ribbon describing an invisible rectangular form. I have experimented with scale by creating a twenty-five foot continuously repeating clover-form using one-inch Electrical Metal Tubing (EMT) but was inhibited by cost. Working with a steel tube specification viable for strength *and* effect proved outside my economic reach (see fig. 13). I do look forward to exploring larger steel sculptural expressions of the labyrinth including square steel tubing and angle iron when resources are more forthcoming.

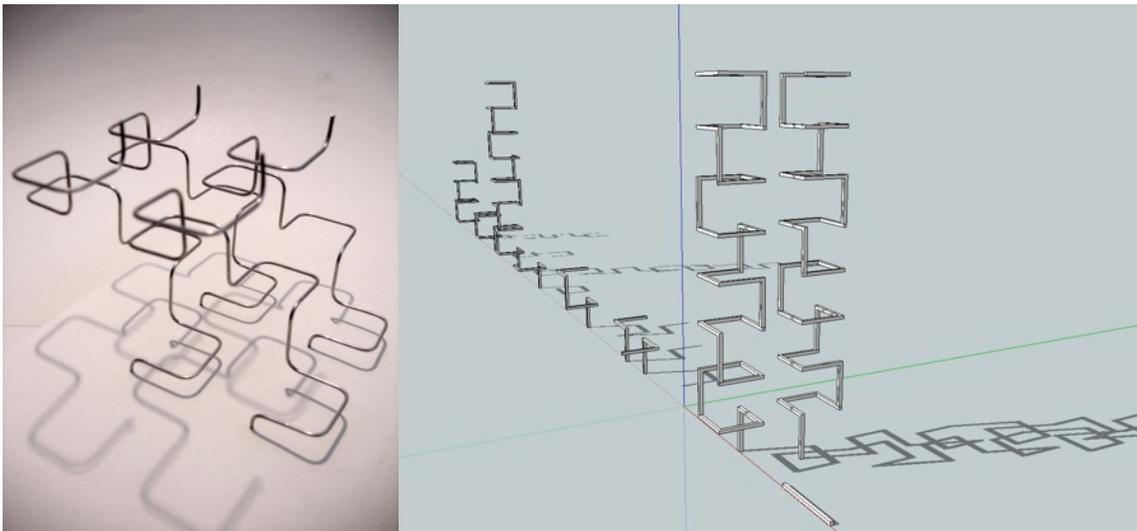


Figure 12. Simultaneous exploration of wire forms: hand-bent wire (left) and digital construction with *Google SketchUp* (right).

So far, the history, technique, experience with, and interest in making the labyrinthine works has been detailed. Now some observations of the audience interacting with it.

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When observing people in the act of visually examining my labyrinth drawings, it is not unusual to witness the full engagement of the work at both near and far distances.

Almost without exception the viewer will intuitively create a distance from the work, whether by stepping back from it or pushing it away to the extent of his reach in the case of a hand-held work. This action exemplifies Gombrich's *Etcetera Principle* which describes the tendency in observation to generalize elements of repetitive details into a single mass (Gombrich 99) or to push purposefully into a loss of definition (Gombrich 97). In the case of the labyrinth drawings, this act results in rectifying the perplexing paradoxical contour into a tonal landscape which is in fact a re-representation of the source image.

Once satisfied with the distant view, without fail the viewer will examine the work closely, often expressing amazement that the single line coalesces into the variegated tonality only observable from a distance. As the creator of such work there is a reward for me when this dimensional dialectic is appreciated by my audience. When the viewer engages my work from both far and close, with distinct experiences drawn from each, I know the work is successful as evidenced by its power to literally move the viewer hither and yon. In one hand my intent is to exemplify my notion of *transdimensionality* through the successful use of line, form, complex surface treatments, hidden subjects, and language where appropriate. In the other hand, I aim to set-up the same close/distant dynamic in an effort to connect with the viewer at the individual level. My challenge is perfectly articulated by the artist Maya Lin. On the subject of public



Figure 13. Twenty-five foot long clover design in EMT.

sculpture, in particular the memorial, Lin states:

I think you have to talk to people on a very individual level. I think you have to move past the monumental civic scale. And I think from my works you have to communicate almost on a one-to-one basis, that they become very, very personal. That (sic) we're not dealing with almost a didactic form of forcing an idea or a thought at you, but you are really communicating, you're sharing a history. And then you're hoping when people read and remember this history that they're going to come away slightly changed, slightly different, and maybe in the future, will behave differently.⁶

It is in the tradition of these privileged and thoughtfully designed public spaces which allow for deep personal inquiry, that my work is headed. Therefore, the real question for me as a designer is: Can I create an object that communicates and elicits a sense of reverence for the unknowable Universe and draws the viewer into a personal moment of passive or active introspection? In other words, can I create an object that triggers momentary attenuation of ego?

One of the world's most recognized contemporary painters exploiting the near/far dialectic in his work is Chuck Close. Close composes large paintings built upon a small grid of hundreds of smaller paintings on the same canvas. The near view is a mosaic of colorful tiles, each distinct, yet all following a specific set of constraints that keeps them equivalent from a system's perspective (see fig. 14).

The distant view of Close's work reveals a completely new and important aspect of the work not observable from the higher dimension of the near view. The distant view

⁶ "Maya Lin and the Confluence Project". Interviewer Emily Harris. Think Out Loud. National Public Radio. KOPB. Oregon. 11, Nov. 2010. Radio.

has the effect of compressing the individual grid elements of the canvas into a single mass (Gombrich's *Etc. Principle*) to reveal a photo-like image, usually a portrait (see fig. 15).

Our work is contemporaneous in this way.

The Close paintings demonstrate the principle of *transdimensionality* by way of purposefully communicating relevant

information about the work observable only from pre-defined vantages which correspond to higher and lower dimensions of perception.

The information transmitted at the near perspective cannot predict the information obtainable only from the distant perspective and *vice versa*. There is a fractal quality at play such that the larger painted canvas, a single unit of thoughtfully composed forms, is built upon a grid of smaller discrete forms or units, each thoughtfully composed

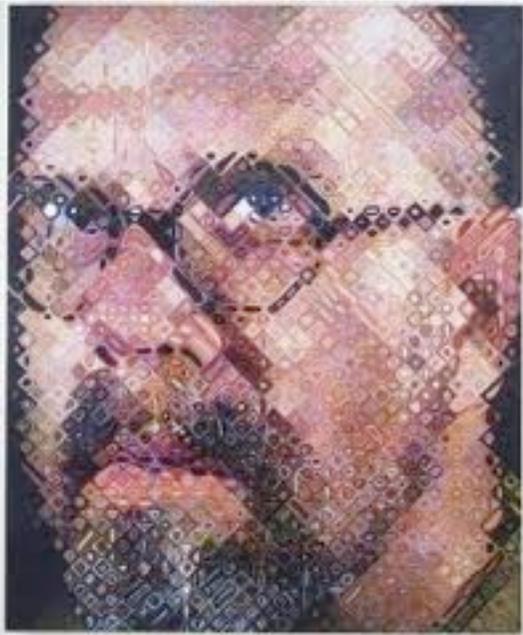


Figure 15. Distant view of *Self Portrait*.
([image: www.metapedia.com](http://www.metapedia.com))



Figure 14. *Self Portrait* by Chuck Close, 1997
(detail).

from the similar elements (Pye's *free workmanship*). Thus, the viewer who moves to and from the canvas to take in both perspectives, exists in a fractional dimension – neither the first or second order of dimensional magnitude – while transversing from the near perspective to the distant one.

At the PNCA ACD department *In-Process Exhibition* this past winter, I conducted an experiment in transdimensionality. Letters were inscribed

on various planar surfaces of monolithic forms that from most perspectives appeared to be abstractly or half-hazardly arranged. To my delight, viewers instinctively responded to cues that encouraged and rewarded the active engagement of the work. After moving to and fro, left and right, the words, “TRANSDIMENSIONAL MANIFOLD ARRAY” were readable (see fig. 16). This experiment had two purposes. First, it was an initial foray into demonstrating the principle of transdimensionalism. Second, the experiment aimed to validate my hypothesis that my audience will work to remove obstructions to meaning and understanding when engaging a work of art if the means to do so are at hand. Lastly, the experiment served to establish to myself that I can design an experience with enough power to physically coax my audience into a specific perspective. These are important lessons for me as a designer intent on creating works of presence imbued with the power to create a momentary loss of ego, a sense of interconnectedness, in my viewer.

In the sciences, scholars of optimization mathematics have shown interest in my unicursal drawings. There is a strong similarity between my hand made images and the computer graphic algorithms of these researchers. One scientist, Karan Singh, states that he is impressed with my intuitive approach to producing *technically* attractive unicursal



Figure 16. *Transdimensional Manifold Array Experiment*, December 2010.

drawings resembling the graphic output of a particular inquiry known as “Traveling Salesman Problems (TSP)”. TSP solutions are generated by computers that calculate optimized paths representing the shortest distance linking a set of specified geographical locations. TSP optimization mathematics are used extensively in the logistics industry to generate efficient delivery and transportation routes (see fig. 17). Certain approaches to solving TSP problems involving tone density matching and stippling constraints yield photo-like images generated from unicursal lines. One key difference between my drawings and the computer generated works is found in my allowing the gesture of the mark to be influenced by the material it is representing. As a basic example, when rendering hair, rather than simply addressing the tonal quality, I often follow the direction of the strands. Commenting on the quality of my images, Singh observes:

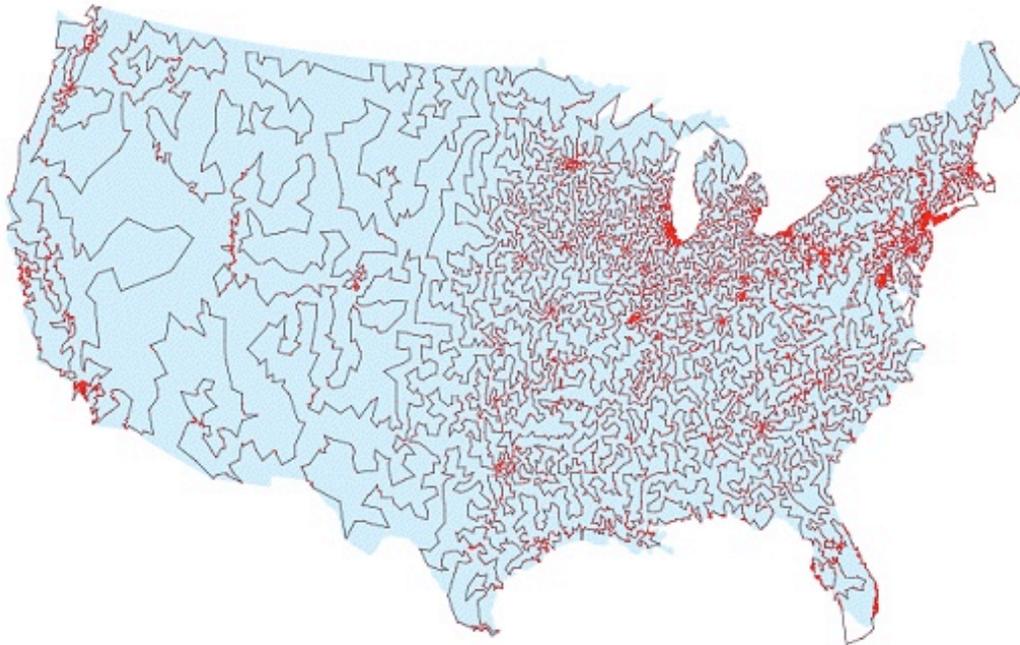


Figure 17. TSP output of 13,509 points on USA map.
([image: Center for Research on Parallel Computation, Rice University](#))

Firstly, you match tone well. You also try and keep equispacings in certain areas in as much as a hand eye approach can. What I find most appealing about your structures is how they use jaggy vs. smooth regions of the line for effect, the use of negative space (empty regions) and directionality of the lines sometimes.⁷

It is my human creativity – to literally draw correlations between my labyrinth curve and the material being represented by that curve – that differentiates my work from the output of an artificial intelligence (see fig. 18).⁸ To determine tone, the computer's analysis is limited to the source *image*; whereas an

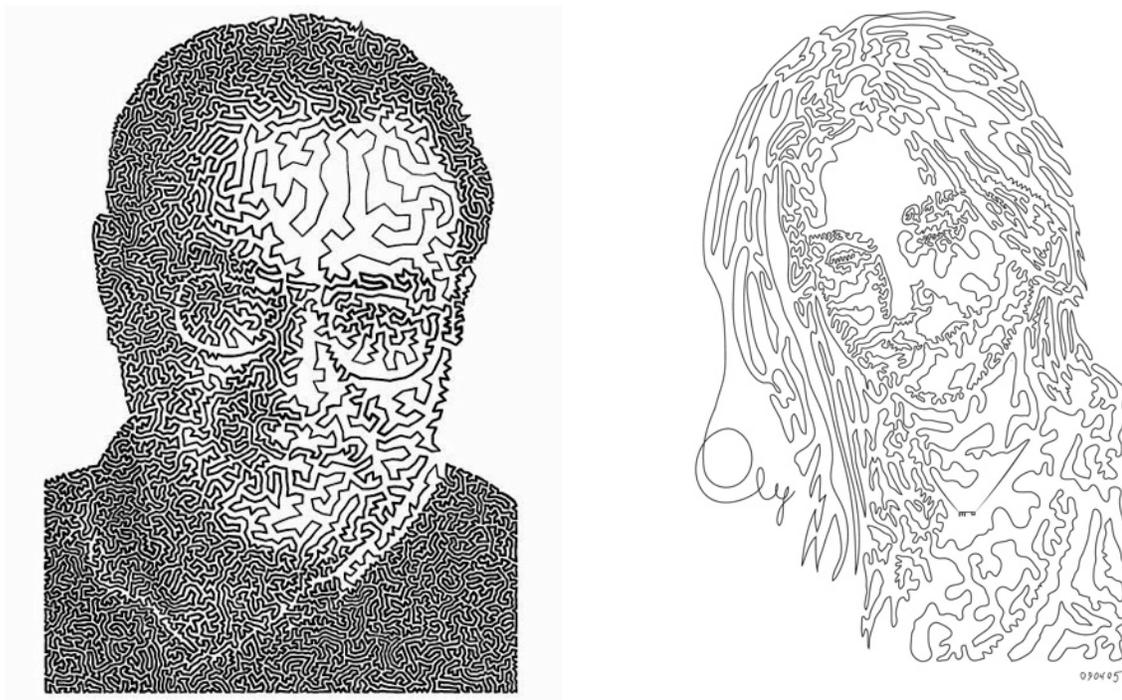


Figure 18. Stylistic difference: Artificial Intelligence vs. human creativity. (TSP image of *Robert Bosch* by Craig T. Kaplan, PhD. LP image titled *Oly* by the author).

⁷ Singh, Karan, PhD. Message to the author. 2 December, 2010. Email.

⁸ In fact, this different treatment of the same subject might be employed as elements in a visual Turing Test. The Turing test is a test of a machine's ability to demonstrate intelligence. <http://en.wikipedia.org/wiki/Turing_test>

artist can analyze both the source *image* and *subject*. In August of 2006 Singh used my work to exemplify this observation in his conference lecture at the Annecy Animation Film Festival in France. In a forthcoming book on TSP mathematics by professor of mathematics, William Cook, my work is cited in the chapter on artistic expressions of TSP mathematics. I hope to engage the science and technology community further through works to come from this practicum.

The TSP studies are concerned with optimizing for minimal distance. Because the act of creating a LP drawing is exhausting, I tend to want to minimize the amount of time it takes to complete. Thus, there is a direct relationship between the total length of my curve and the total time to create it. So the desire to minimize the time is directly represented by a shorter, “optimized” curve. This is where my work overlaps with the field of optimization mathematics and most specifically, the commercial applications of the Traveling Salesman Problem. The difference is that my approach is entirely intuitive and produces an artistic benefit, where as the computer algorithm is entirely rational and produces a cost-savings benefit. But both are motivated by the most conservative and efficient use of energy resources.

Another area of optimization mathematics that might be related to my sculptural work is the Hilbert space-filling curve. Whereas TSP curves are concerned with optimizing for minimum distance, Hilbert curves optimize for maximum length in a minimum space. These curves relate to both area and volume. Hilbert algorithms are used in the design of RFID antenna arrays and are being explored for their possible applications as resonators for other purposes (see fig. 9). A scientist/artist at the University of California Berkeley, Dr. Carlo H. Séquin, has fabricated some interesting sculptures in metal demonstrating a closed Hilbert curve of the fourth order (see fig. 19). Also, artist/mathematician Chiam Goodman-Strauss has created some interesting

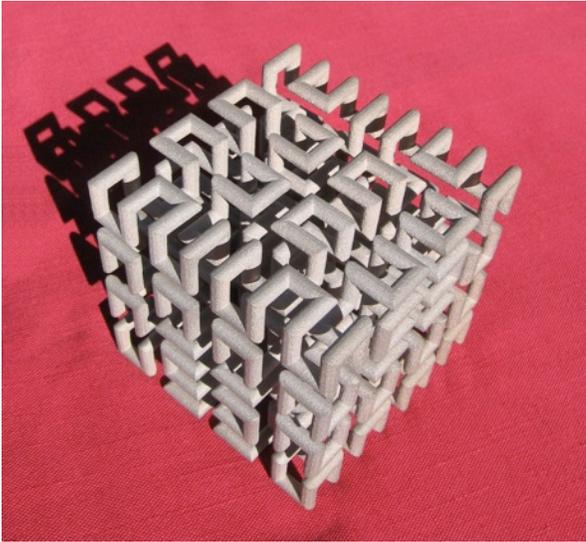


Figure 19. Carlo H. Séquin's, *Hilbert Cube 3D*, 2005.
([image: Carlo H. Sequin](#))



Figure 20. C. Goodman-Strauss, *One of N*, 2010.
([image: C. Goodman-Strauss](#))

sculptural representations of the Hilbert curve (fig. 20). But truthfully, though these last two examples do justice to representing a complex mathematical concept, they are uninformed by the right hemisphere thus lack a non-rational quality.

Both Peano and Hilbert curves are included in the realm of fractals. In simple terms, every scale of the structure is built upon the replications of an identical sub-structure. This reiteration of the same structure, level after level, is a quality of fractal expressions. Fractals are a late-comer in the development of mathematics having been a recognized field only since 1975 when the term was coined by the Franco-American mathematician Benoît Mandelbrot.

When commissioned by the British government to measure the length of the British coastline, Mandelbrot discovered an interesting phenomenon: The closer one looked, the shape of the curve that describes the coast continually repeated itself. The rocky crags that define the jetties and bays are the same shape as the very rocks that the crags are built-up from. Even the edges of those rocks are repeated at the granular level and so on. Mandelbrot concluded that the coastline is technically infinite. It is this

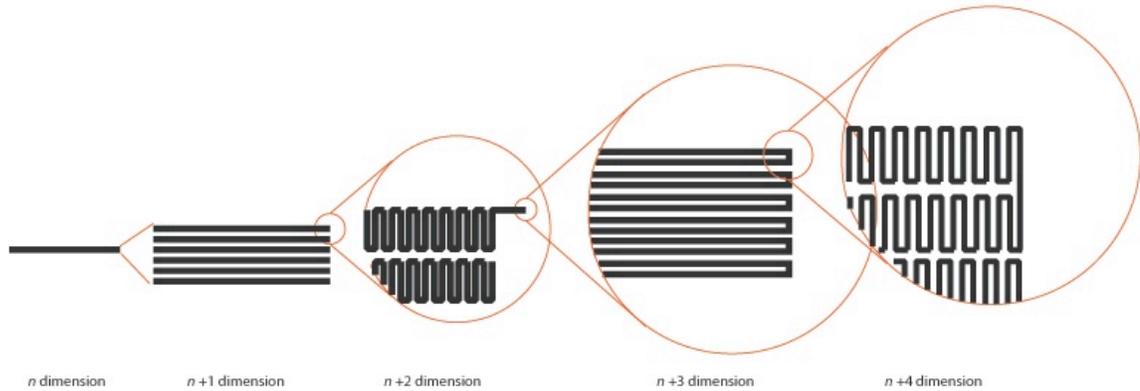


Figure 21. Example of a fractal line similar to a Peano curve.

repeating phenomenon along the dimension of scale that make fractals so unique and interesting. My labyrinth lines are an artistic abstraction of this concept and either contain or suggest an actual fractal quality. Forms made from curves made from still smaller curves, and so on (fig. 21).

Anamorphosis is a visual effect long used in art-making that most closely illustrates transdimensionality with the most relevant historical example being Hans Holbein's *The Ambassadors* (fig. 22). The viewer will find a perplexing, if not all together jarring, incomprehensible form in the lower center of the composition. Viewed frontally, this element appears as a diagonal smudge. Viewed from the right at



Figure 22. Hans Holbein, *The Ambassadors* ca. 1533.

an extremely oblique angle, the painted image is compressed along its width (or “X-axis”) coalescing into a well-rendered human skull (fig. 23). (Of course, the rest of the painted image is indiscernible at this vantage.) A work qualifies as transdimensional, not when it can be simply observed from different perspectives, but when those different perspectives are designed into the work intentionally and are integral to a full understanding of the work. It as a means to the hidden subject of a work.

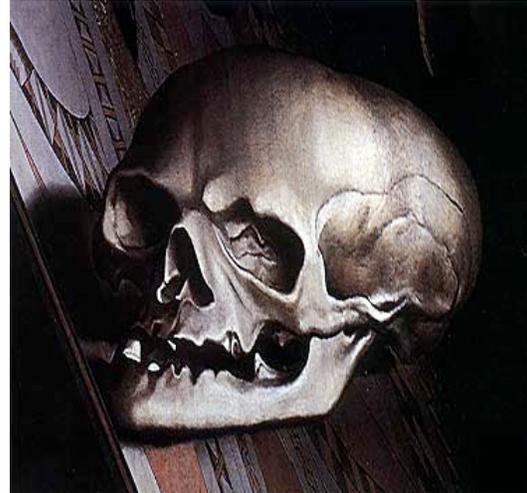


Figure 23. Reverse distortion applied to detail of Holbein image.

Our perception system uses many different strategies to visually interpret the space around us. Though stereoscopic, we see only in two dimension (if you exclude the passage of time). We see a planar view before us, it is only inferred to be three-dimensional and becomes so only when comparatively changing our physical relationship to it or it to us. So our brains are constantly calculating the form of many volumes by a reciprocating process of observational measurement and computational inference from a rapid sequence of two-dimensional images. It is an exciting challenge to activate this *nether space* by addressing the viewer’s physical relationship with the object to extract another level of meaning only visible from privileged perspectives. It represents the idea that there is another reality and this work is a glimpse of it through the seems of our own reality.

Single, highly specific, privileged views are non-dimensional because they cannot be measured. A perfect non-dimensional perspective is binary: The new, relevant

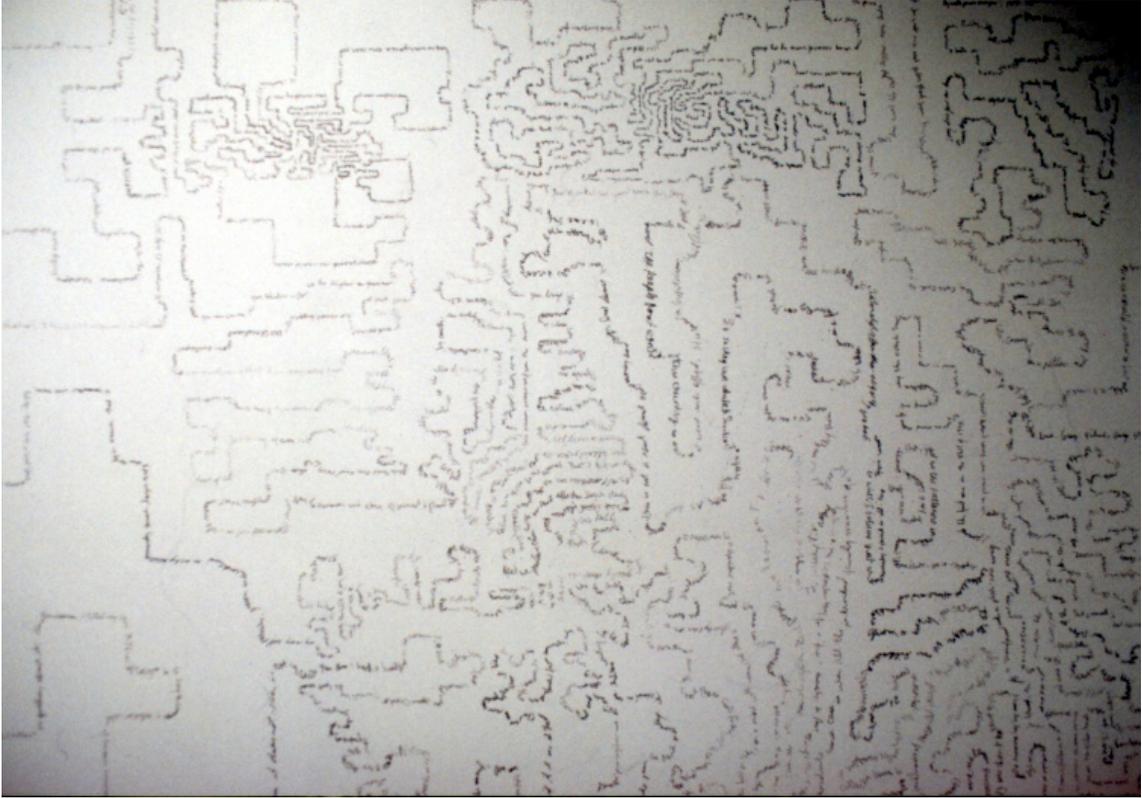


Figure 24. Author's *Eye to Eye*, 2003, a labyrinth line drawing made from a continuous line of scripted text.

information is either perceivable or not perceivable. This place exists in the middle between two-dimensional and three-dimensional space and is therefore fractionally dimensional. A work that intentionally exploits this in-between dimension is said to be *transdimensional*.

Considering precedents, there are many since these explorations are expressed through different media and with significant variations in the application of the technique. This is clear when comparing the conceptual drawing *Eye to Eye* (fig. 24) and a recent exploration in machined acrylic (fig. 25). Some work like the machined acrylic piece have ties to Minimalist sculpture, specifically the monolith work of Anne Truitt which essentially was transdimensional through its attempt and success in collapsing three-dimensions into two (see fig. 26). Sol LeWitt's grids and repeated linear forms are strongly related, perhaps even influential (see fig. 27). Some of my acrylic labyrinth

sculptures seem rooted in minimalist tenets with their perfectly machined surfaces, man-made materials, and the removal of marks indicating the hand of the artist. However, this is not true of all my labyrinth expressions. Also, I am not exploring the same concerns as the Minimalists to draw close comparisons beyond the aesthetic.

When it comes to my interest in creating site-specific work for the purposes of connecting my observer to our solar or galactic clockworks, there are the ancient precedents of the Mayan and Egyptian pyramids, Stonghenge, and other neolythic sites that firmly place the audience in a specific relationship to the sun, moon, and stars. An interesting contemporary example of artists exploring man's relationship to the heavens is Charles Ross' *StarAxis* in New Mexico's eastern plains.

Rivaling the Mayan pyramid at Chitchén Itza, Ross' work is on such a grand scale that it dwarfs my own physically, but the drive for the work is the same. Ross feels an undeniable motivation to reconnect humanity with the stars at the individual level as was our star-gazing practice for millennia. Only in modern history have we mostly relegated that fascination to scientists. Like Ross'

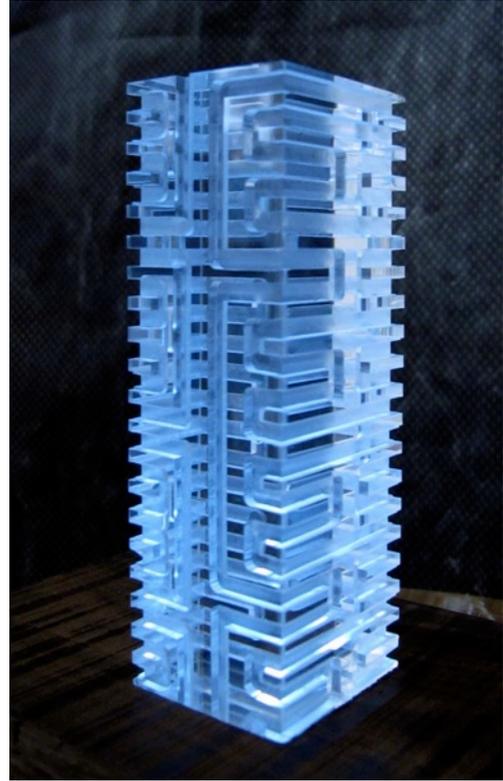


Figure 25. Author's *Untitled* acrylic monolith.

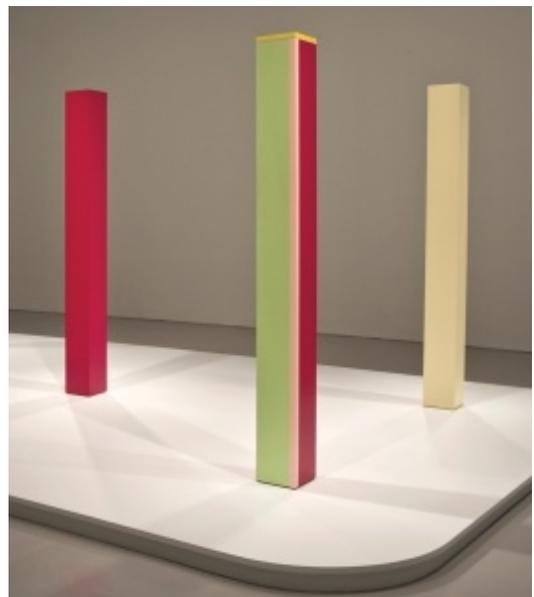


Figure 26. Anne Truitt's *Elixir*, 1997.

earthwork installation, my transdimensional labyrinth sculptures will connect the universe to the individual through a whole-body visual experience. This personal-universal relationship is achieved by privileging the view of a single person who stands at a unique point in relation to the heavens as enabled by the art-object.

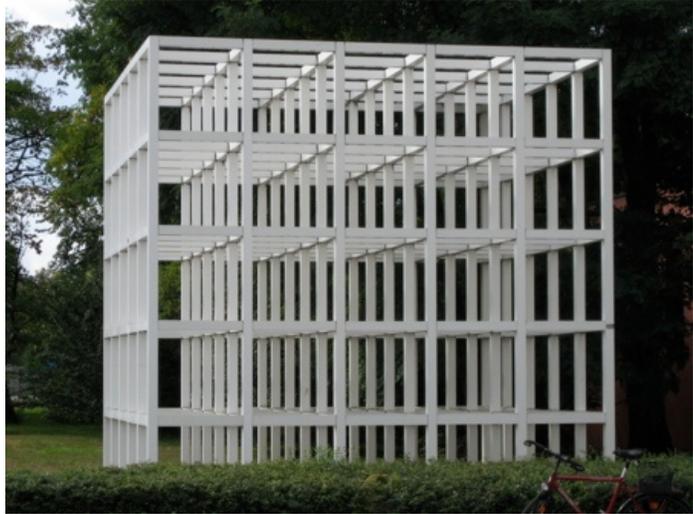


Figure 27. Sol LeWitt's *Modular Cube*, 1928 - 2007

Labyrinths proper, such as the Chartres or Cretan styles, are expanding in the Western consciousness (fig. 28). Labyrinths didn't appear on the American cultural radar until the mid-1980's. Now, however, there are more Labyrinths cited in the U.S. than anywhere else in the world (Westbury 66). Consistent with the growing awareness of

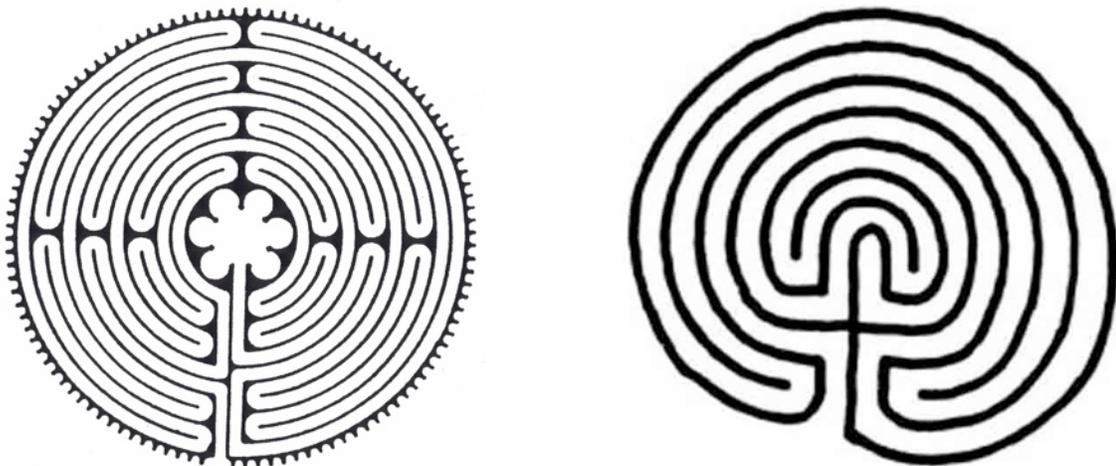


Figure 28. Chartres and Cretan style classic labyrinth motifs.

labyrinths in the general community is a growing interest in the scientific community to quantify the reported benefits of interacting with labyrinths which are: euphoria, serenity, introspection, self-awareness, epiphany, presence, stress reduction, extreme emotions.

Citing the measurable benefit of negotiating a labyrinth, either on foot, or by finger, Neal Harris writes:

A labyrinth is a path for assisting mental focus, group cohesion, and spiritual connection that has been used by many cultures and religions at different times throughout history. Labyrinths are considered by many to serve a holistic function, namely to further those who are on the path to a more balanced psychological, emotional, spiritual and physical well being (Torrez, 1994). Labyrinths have been, and continue to be used at hospitals, schools/universities, prisons, churches and parks.⁹

My labyrinth designs are indirectly related to traditional labyrinth patterns that have been used for centuries by religious and spiritual practitioners as a tool to recalibrate the soul. The transformative effects of active mediation while walking or tracing a labyrinth pattern (see fig. 29) has long been accepted by enthusiasts of the activity. However recently there's been an increased interest in validating these claims scientifically.



Figure 29. Typical finger labyrinth.

⁹ Harris, Neal. "Effective, short-term therapy: utilizing finger labyrinths to promote brain synchrony". *Annals of the American Psychotherapy Association* 5.5 (2002): 22+. Print.

In his doctoral thesis researching the benefit of finger labyrinths on pediatric oncology patients, Dr. Peter Taylor's research demonstrated, "that finger labyrinths provided a container for expressing emotions, dealing with the anxiety of life-limiting illness, and finding hope for the future."¹⁰ A widely accepted definition of the contemporary labyrinth that supports my work is, "a single path or unicursal tool for personal, psychological and spiritual transformation."¹¹ Like the Hindu who repeats a mantra, a Muslim who counts the malas (prayer beads), the Catholic who prays with the Rosary, or the Pagan who ambulates a labyrinth, my audience's attention is subtly transformed from visual interest to rhythmical meditation.

The careful choreography of visual twists and turns could conceivably place my viewer in a state of hyper-suggestibility resulting in the Labyrinthine Projection potentially becoming a self-hypnosis tool for personal transformation targeted to achieve specific effects. Just as the bee's patterned dance in the hive gives directives to the other bees about food sources, could the Labyrinthine Projection be fashioned with a pattern that, when followed with the eyes, would give subconscious directives to the viewer? Patterned, rhythmic activity is a powerful tool for controlling the mind. It follows that a thoughtfully designed pattern can have an influence on the mental state of my audience, even if nothing more specific than feeling more relaxed.

Thus far, we have looked at the beginning roots of my interest and practice of drawing unicursal curves since childhood on the Etch-A-Sketch, the discovery of its

¹⁰ Taylor, P. L. "Healing pathways of faith, hope and creativity: The effects of finger labyrinths on pediatric oncology patients". Unpublished doctoral dissertation, Wesley Theological Seminary, Washington, D.C., 2007. Print.

¹¹ "Learn About Labyrinths. *The Labyrinth Society*. 11 Nov. 2010. <<http://labyrinthociety.org/about-labyrinths>>

ability to communicate photo-like images, and my interest in exploring the labyrinth aesthetic beyond flat, two-dimensional images. I introduced connections to my work and that of other artists and scientists, and drew connections to possible influences and references such as Minimalism and optimization mathematics.

The boundary layer between object and experience is a fractionally dimensional space I hope to draw my audience into. A space where privileged perspectives offer unique opportunities to glimpse the sliver of space between the known and unknown. A space large enough for big questions, but small enough for real answers. A space entered through the eyes and guided by line to one's own personal Minotaur.

Work and Process

The first step after declaring the practicum subject as “the transdimensionalization of two-dimensional labyrinth forms into higher dimensional expressions, such as the added dimensions of depth and or time,” was to rethink my usual approach to creating the two-dimensional works. In those pieces the materials had been, without exception, ephemeral in nature such as the ink from a Sharpie marker, the lead from a pencil, the paint from a Deco paint marker to cite a few examples. Including the virtual materials used in the digital domain of drawing or animating software, even considering the pigment output of a printer, none was capable of existing in real three-dimensional space *and* holding a form. I needed to find a way to represent the line in a tangible material.

Touched on earlier, solid metal wire was the most obvious material to represent a line of consistent weight and hold form. Thinking of the term “wire” loosely would also allow scale to be explored from small diameters like twelve gauge copper wire to much larger diameters of tubing and pipes. In terms of scale, my explorations peaked at one inch EMT tubing. My first goal when working with wire was to direct a hand/tool manipulation of the material into forms that could support themselves while adhering to the basic tenet the Labyrinthine Projection, mainly the unicursality (see fig. 30).

As I became more comfortable with the limitations of the material, my goal changed to creating a form that would allow for the development of the other compelling feature of the LP work: the photo-like image. However, it soon became apparent that to achieve this effect, the line work would have to be problematically dense. I didn't, and still don't, think it's impossible, but there were other processes I was exploring simultaneously that my attention favored at this point. Though the complexity of introducing an image into the form was off-putting, I was still interested in exploring a human scale sculptural

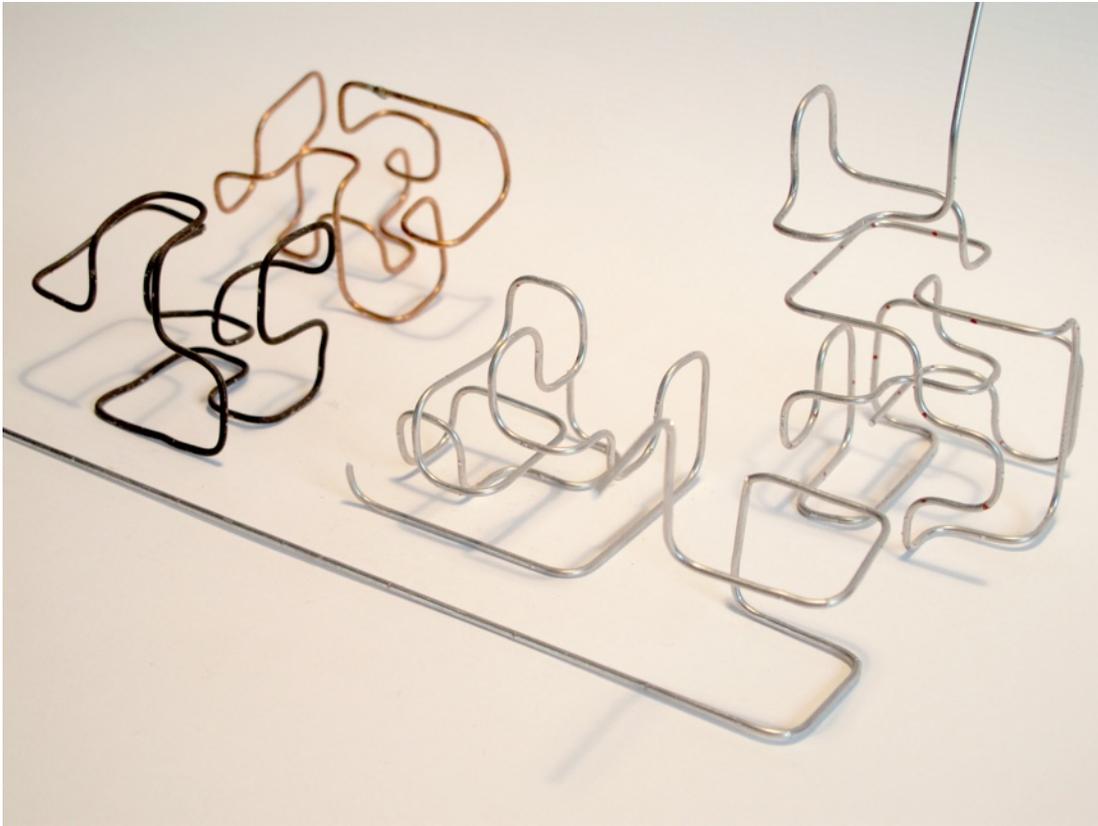


Figure 30. Sampling of wire form explorations.

form from solid steel rod. Bent and welded rod in diameters from 0.187" to 0.437" was explored. The first was a standing, freely worked piece with a closed, unicursal line meandering within an implied monolithic volume (see fig. 31). Its companion is a suspended piece also made from bent and welded steel rod describing the surface of an implied monolithic form, but unlike its predecessor, does not explore its own interior volume (see fig. 32).

In an act of childlike wonder, I attached a dripping paint reservoir to its elongated tail. The sculpture was then lightly impacted causing the ink to splatter about on the large piece of paper laying below. The resulting *harmonographic output* is remarkable when you consider the nested squares related directly to the object itself as might be drawn in perspective. In essence, the object rendered its own self-portrait as observed vertically

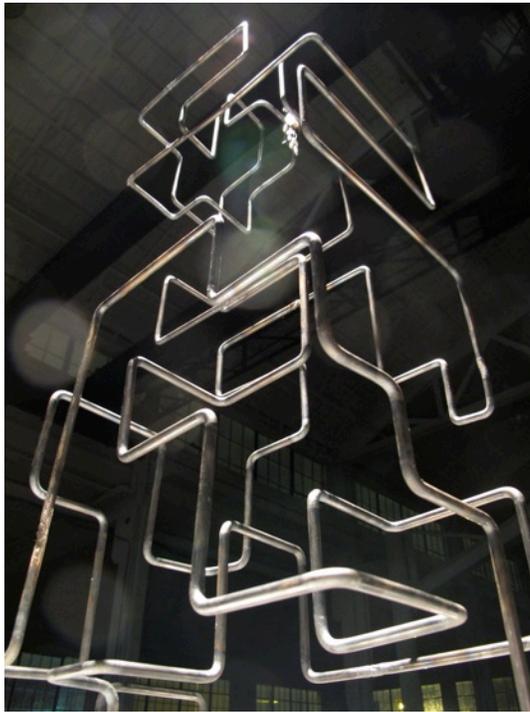


Figure 31. *Labyrinth 110326* steel rod, 24 x 16 x 10 inches.

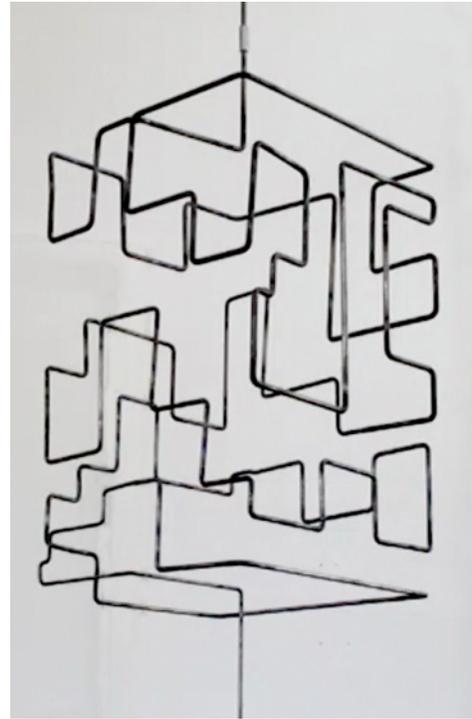


Figure 32. *Labyrinth 110401* steel rod, 48 x 16 x 16 inches

(see fig. 33). [Note: the vertical strip resulted from a separate, earlier run on the same sheet of paper.]

One thing I noticed when using wire to create labyrinth forms was the difference between working with a material in length – in essence a line already drawn but merely finessed into a variegated direction – versus the creation of a line that didn't already exist as in drawing. In retrospect, this difference proved to be directly related to my personal satisfaction of the creative practice. Also when working with wire, many if



Figure 33. Harmonographic output of *Labyrinth 110401*.

not all of the characteristics of drawing, such as flow and rhythm, were superseded by a very clunky mechanical encumbrance of moving the remaining length of material as the bend at hand was being formed. The process became much less meditative and much more demanding of spacial thinking.

Since spacial calculations are mostly processed in the left hemisphere of our brain, it stands to reason that the hemispherical balance would shift away from the right half where we free-associate. In other words, the rhythmic transversal from left to right hemispheres that I mentioned much earlier was no longer in balance and occupied less right-hemisphere activity where we know more relaxing mental activity occurs – the same hemisphere most active during meditation¹². Put plainly, bending wire just wasn't as satisfying as turning cranks and wheels, so I didn't explore this too much further in favor of the explorations that featured the milling process.



Figure 34. Modular, magnetic visualization system.

The wire explorations culminated with the two steel rod sculptures. Though I have interest in pursuing this direction further in my post-graduate work, I had to put a hold on furthering the wire pieces as there were other explorations that required my attention at this point. Extensions of this exploration might next lead to a scale large enough to climb and perform on as in a springy “jungle-jim.”

¹² Field.

A discovery along the way worth mentioning was a visualization tool to help design complex, three dimensional wire forms. By bending a length of brass tube to 90° and fixing a north magnet in one end and a south magnet in the other, I fabricated a basic and repeatable unit that could interconnect with other pieces strongly enough to hold the collective together in whatever shape desired (see fig. 34). The commercial potential of this fun little toy gadget seems worth investigating.

Having discovered enough about how to construct labyrinth forms from wire, I turned my primary focus to hand-milling channels into different materials. It is worth noting that after realizing the association with the axis wheels between the Etch-A-Sketch and the milling machine, I clearly understood my attraction to the latter.

§

Besides bringing me the most enjoyment, the milling of labyrinth channels into solid materials such as wood, wax, and acrylic seemed the likeliest way to achieve the line density required to create a projected, photo-like shadow image. Having achieved a requisite comfort with the actual milling process, my thoughts focused on two other concerns – the design of the line’s path and developing an electroforming technique to solve the same issues as faced with the wire (mainly strength versus mass of the material). Channels were milled into wax, then the channel interior was painted with a conductive paint. In electroforming, metal will accumulate on anything that is part of the electrochemical circuit. Thus painting the conductive paint in the channels and connecting the coating to the electrical system of the plating setup, I was able to “grow” metal in specific places and no where else.

It is important to recognize the difference between *electroplating* and *electroforming*. The former is intended to apply a thin layer of metal onto the surface of an object, known as the *mandrel*. Electroforming is a process of building thicker layers of metal plating on an mandrel, typically to give it mass and or structural strength in addition to the metallic quality. Electroforming also differs in that typically the mandrel is removed after the desired metallic accumulation – either dissolved chemically or burned out with heat. In electroplating, the mandrel remains.

Regardless of approach, any structure made from a single line of material has to have more strength than weight to be self supporting. Because the shape of a material can affect its strength as significantly as its mass, I experimented with different channel shapes including square, rectangular, oval, and hemispherical. In addition to channel

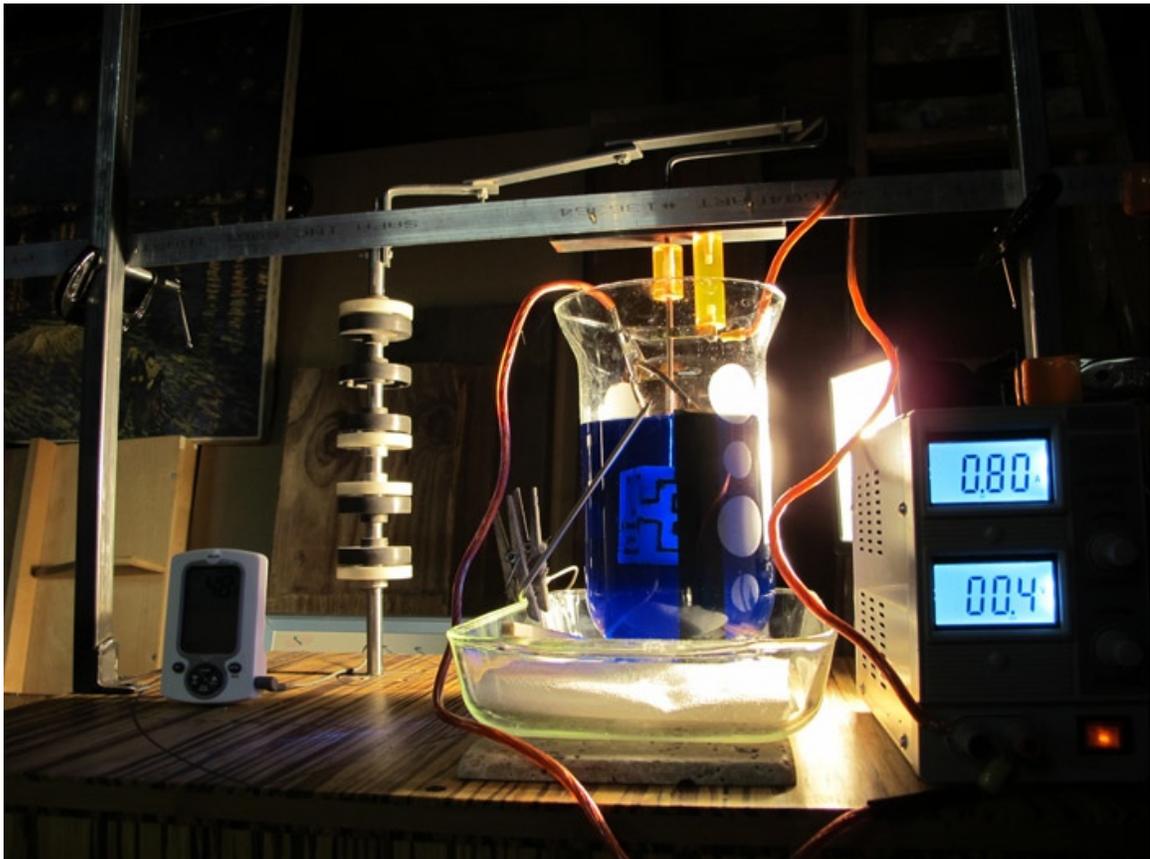


Figure 35. Electroforming setup with auto-rotation mechanism.

shape, I was also experimenting with density of material build-up and how voltage and amperage could be modulated to achieve different results.

As I began to design denser lines over larger forms, the limitations of my equipment emerged produced diminishing results. To help overcome this trend, I designed and fabricated a motorized mechanism that would constantly reposition the mandrel in relation to the electrode. The default process is a static mandrel-to-electrode relationship which tends to concentrate the molecular build-up on the regions of the mandrel that are closest to the electrode – the electricity wants to follow the path of least resistance which is invariably the shortest distance. By implementing a mechanism to turn the object constantly throughout the twenty-four hour electroforming process, I was able to greatly improve the consistency of the metallic build-up (see fig. 35).

Interested in crafting much more complex forms, I began explorations in how to achieve this knowing the limitations of my setup. One such complex form was created titled *WRITE Hand* which has the letters W R I T E embedded in a labyrinth construction (fig. 36). The form is an abstraction of the human hand. The piece met with limited success, but was invaluable in developing the technique for the next generation of electroformed labyrinth

structures. As satisfactory as was *WRITE Hand*, electrical conductivity issues over extended linear distances on the mandrel prevented the success of larger forms. One method I developed to overcome this limitation was to extend the electrical network

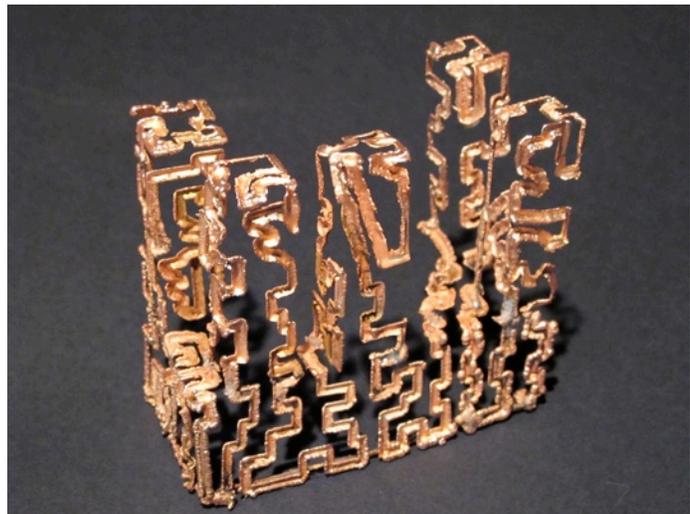


Figure 36. *WRITE Hand*. Electroformed copper, 6 x 4 x 3 inches.



Figure 37. Wax mandrel for *Labyrinth 110501* showing milled channel painted with conductive coating. Electrodes connect channels to circuit of electroforming

over a larger area of the mandrel (see fig. 37) To be sure, I intend to continue with this aspect of the labyrinth technique following the knowledge detailed here.

Concurrent with the electroforming explorations were labyrinth designs milled into clear acrylic Plexiglas®. This material took well to the technique and produced some stunningly futuresque objects that are easily imagined at a grand scale. They are moquettes for skyscrapers (see fig. 25). The lines

were enhanced on some with difference treatments including black lacquer, ferromagnetic paint, electroformed copper, and internally refracted light (fig. 38). Ferromagnetic paint was employed to give the line a magnetic capacity. I was interested in encoding the line with the same type of information normally stored on magnetic audio or video cassette



Figure 38. Four treatments of acrylic labyrinth (L to R): lacquer, ferromagnetic paint, electroformed copper, and light.

tape. The idea is interesting; however, the quality of the interaction was unremarkable and will need to be explored further to achieve results that are more engaging.

Progress was being made in technique, but the real break-through came in design. I devised a way to transfigure a medieval eleven circuit labyrinth – also called a Chartres labyrinth – from a flat, circular, two dimensional pattern into a three dimensional monolithic form that could be milled (see fig. 39). The base shape could be cylindrical or spherical. Later it occurred to me that a sculpture made of wire in this transfigured pattern would cast a Chartres labyrinth shadow around itself from a single light source close, but directly overhead. Some simple test constructions were made and verified the effect after a small but significant mathematical modification.

Other variations on transfiguring the traditional labyrinth form yielded very interesting results. A single iteration of the pattern creates a dialectic – an inside and

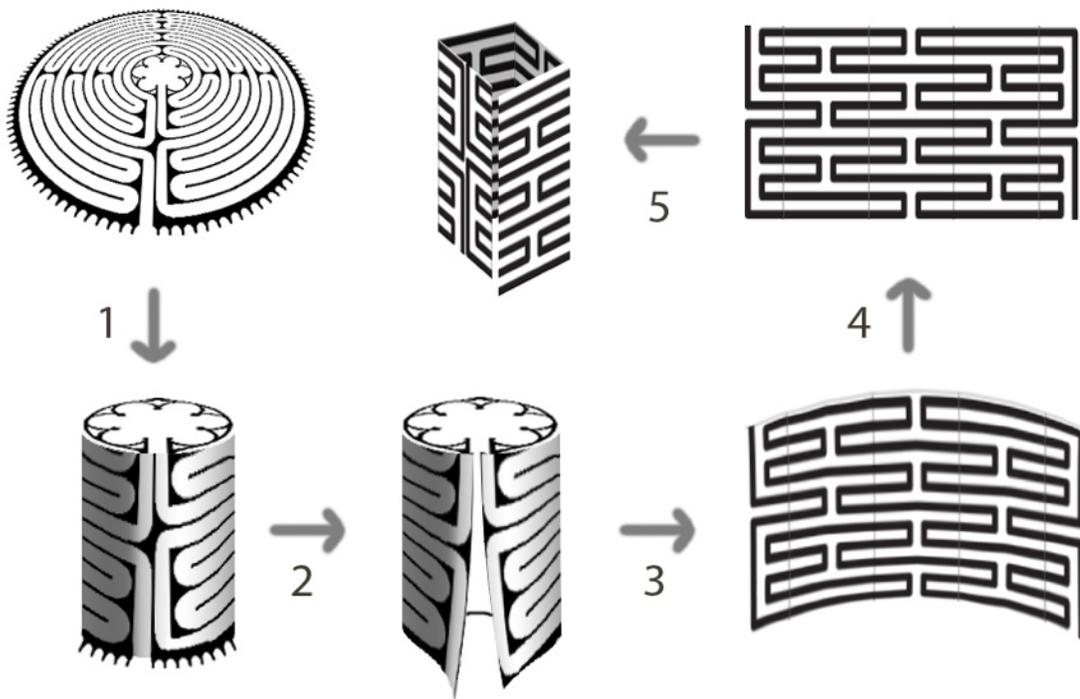


Figure 39. Transfiguration of the Chartres labyrinth.

1. Stretch over cylinder; 2. Cut along length; 3 & 4. Open and make flat; 5. Fold into planes if desired.

outside, the path goes in, then comes out. By combining two such forms in three dimensions a loop is created which easily represents infinity and the *ouroboros*.¹³ The graphic nature of these transfigurations is remarkable and led to a much greater appreciation for the original pattern itself. New and intriguing variations were later used as the basis for kinetic sculptures and narrative sequence, both of which will be detailed later.

Due to its transparency and the way the milling process affected the cut channel, acrylic was the material of choice to explore transdimensionalism in a futuresque style. By extending a portrait-based labyrinth over several surfaces of a multi faced form, an exemplary transdimensional object was crafted. The finishing detail was in the application of an opaque black coating to the milled channel as a way to reference its origin, namely the Sharpie marker (see fig. 7).

When properly aligned with the triptych monolithic object, thus viewed from exactly the correct perspective, the viewer is able to recognize an otherwise indiscernible face. From this spacial relationship between viewer and viewed, the object occupies a visual space between two and three dimensions. I emphasize *visual* space, as the object never departs from three dimensional physical space¹⁴ (see fig. 40).

Midway through the semester, and as my formal practicum work was gaining stride, a visiting artist and lecturer from Virginia Commonwealth University, Sonya Clark, made a comment of profound impact during a critique of my work. “I wonder what these objects *sound* like, especially considering your background as a recording engineer,” she remarked. Like a splitting atom, my mind mushroomed with ideas. Sound

¹³ *Ouroboros*: the snake that eats its own tail - ancient alchemical symbol of the continuous cycle of birth and death.

¹⁴ As far is commonly accepted.



Figure 40. *Labyrinthine Projection TMA 110405*. Triptych monolith with two discrete Cretan labyrinths. Viewed from front (left) and side (right). Acrylic and wood, 7 x 7 x 7 inches.

had always been in my mind accompanying the creation of the work, but in the background like a mute companion.

I intellectualized the sound, but never once considered its direct representation. Oddly, Sonya Clark was not the first to pose that question; but by tying the question to my background, it was framed differently than had been at other times. Before, I thought of the sound as a personal part of the making. After Sonya Clark's observation, the idea came forward that sound was something that could be shared with the audience. Collaterally, Ms. Clark's curiosity not only unlocked sound, but technology as well. I began to conceptualize several possibilities for the introduction of sound as well as technology into the dialog. My sidelined interest in kinetic sculpture was back in play.

Pondering the sound of these labyrinth sculptures, I began to measure it directly by attaching a *contact microphone* to the objects. Unlike a typical microphone that transduces the rapid changes in air pressure into an electrical signal, a contact microphone transduces vibrations of any object it is in physical contact with. These first steps did not yield anything pleasant, or even interesting. However, drawing on my background as a

recording engineer, I began experimenting with microphone placement, amplification levels, and other practices common to the recording studio. In short order interesting and even pleasant sounds were being produced.

As mentioned in the previous section, for me sound has always accompanied the practice of creating labyrinths. Typically, the sound I hear in my head while executing a labyrinth work is drone-like. Thus, when the sound experiments with the steel rod labyrinth sculpture began producing beautiful and rich drone-like tones, I was astounded. An audio/video documentation was immediately produced. Beyond beautiful and drone-like, the best way to describe the sound being elicited from this object is *otherworldly*. Others who have experienced the sound have described it as mystical, mesmerizing, soothing, ethereal. I can't think of four other words that could better describe the practice of walking a labyrinth.

In his book *Music, the Brain, and Ecstasy*, Robert Jourdain writes of the musical significance of drones which are "tonal centers." The stronger a tonal center, the more a composition can wander (meander) from it. The use of drones in music composition creates very strong tonal centers. It has long been known that drone sounds are related to the formation of delta waves in the brain. Delta waves accompany deep meditative and relaxed states. The Hindu mantra "Ommmmmmmm" is one example.

After properly mic'ing the sculpture, the sound is created by lightly skimming its surface with fingers and hands. This remarkably light contact generates micro vibrations in the object, many of which sustain for long periods thereby accounting for the drone quality. Some areas of the object demonstrating particularly sweet resonance can be flicked with the finger to generate a more bell-like timbre. The sustained *legato* of the drone punctuated with periodic bell-tones makes for an almost musical performance –

one that might nicely compliment a mediation practice or accompany the activity of walking a labyrinth.

In one act of “playing” this labyrinth sculpture, an analog to walking a labyrinth is created when the performer traces the course of the labyrinth path, from origin, to center, then a return to the origin. Unfortunately, due to the extremely high levels of amplification required to achieve this particular sound, it is impractical to produce outside of the controlled environment of the recording studio. Thus, until more development is possible, a public performance at this time would not reflect favorably on the work. However, I envision making the necessary refinements to enable this exciting and promising aspect of the work to come forward in the future.

In the previous section I reported suffering migraine headaches. I described an accompanying visual anomaly in the form of a single, energetic skin stretched over all visible surfaces. This phenomenon was likened to perceiving a non-perceptible place between matter and space. The activation of resonant harmonics embodied by the object is an illustrious aspect of engaging the sculpture haptically. Only through the lightest touch by the fingers will the harmonious quality of the sound be produced. Engaging the sculpture otherwise, or with an object such as a bow or mallet, has a completely different sound characteristic – one that in my opinion is rather cacophonous.

The meandering labyrinth forms that comprise the bulk of my work are visually representative of the energy skin I described perceiving with migraines. This “skin” is neither object nor space surrounding the object. With these audio explorations, I am literally activating the same place through a most delicate touch which is neither so firm as to contact the object much at all nor so light as to hover above it. The too-light touch elicits no vibratory behavior while the heavy touch dampens any vibrations that might be produced. It takes practice to engage the object this way, yet when successful an

otherwise inaccessible component is revealed: The piece literally sings. As this skin phenomenon could not be perceived outside of the migraine condition, the harmonic audio is not accessible outside of the very specific conditions required to activate it.

Still on the topic of sound, another exploration centered on using magnetic audio tape as a material from which to construct a labyrinth form. Like my labyrinth lines, audio tape threaded through the mechanism of a tape machine is continuous, non-intersecting, and consistent in visual weight. Initial investigations used audio tape adhered to a surface (two and three-dimensional). The tape became a labyrinth composition conforming to the constraints of the labyrinthine projection. Additionally, the tape was encoded with an audio program that could be accessed by dragging a tape head¹⁵ along its length. As with the first contact microphone explorations, this endeavor proved to be uninteresting and offered little to contemporary artistic expression that hasn't already been successfully employed by intermedia artists since the 1960's.

Though I discontinued this use of audio tape, I retained an interest in exploring other uses of the material for several reasons. First, I've always enjoyed threading tape through its proper path. Audio tape is very familiar to me having been born to an audiophile father with an extensive reel-to-reel tape collection. Handling the massless material requires high dexterity mitigated by a light touch – something I've been doing for more than 40 years. In fact, in my capacity as recording engineer, I handled tape as a profession. Second, audio tape is an archaic, outmoded technology – a status that can be challenged or pushed artistically. I chose to transform the material through its function by stripping it of its intended use – a carrier of magnetic information related to sound –

¹⁵ A tape head, found in all tape-based audio recording and playback equipment, is an electronic device designed to encode or decode changes in magnetic flux density as a function of changes in sound.

and introduce a purely visual function while still retaining its characteristic motion and unicursality.

Using materials on hand, the first exploration in this series was built on a slab of acrylic Plexiglas. With a 0.030" bit, I drilled and set 100 customized straight pins as shafts for 100 small plastic flanged rollers recovered from the guts of repurposed audio cassettes. The rollers were arranged on a one inch grid. At the top of the construction was placed a single, clear audio cassette. Audio tape was routed from the cassette, then around the 100 rollers before returning to the cassette (see fig. 41). What would normally be one half inch of tape exposed at the open edge of the cassette was now exaggerated by a factor of two

hundred. Like a lab animal or torture victim, the “guts” of the audio cassette were literally eviscerated and splayed for the world to see. The delicate material that was before invisibly housed and protected by the cassette shell is now exposed and unprotected.

If the cassette tape is an object of cultural significance for many, the “mix tape” is paramount. Incalculable hours were spent by me and my generation creating iteration after iteration of the perfect mix tape. Usually the mix tape was a special gift for a special friend. The extraordinary feelings and emotions behind these precious creations were indicated by the choice of music, the song lyrics, the titles and orders of songs, and often the inspired embellishment of the shell, case, and insert.

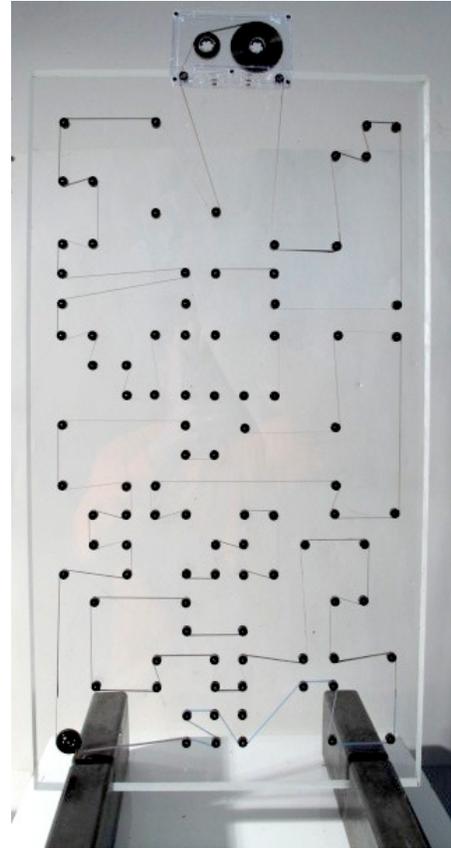


Figure 41 *Crucifixion of the Best Mix Tape Ever*, acrylic, audio tape, steel 14in x 14in x 32in

To take something so personal, emotional, and fragile as a mix tape and literally pull the guts out – pinning them down as if the subject of a dissection – amounts to the ultimate subversion. It is a symbolic act of revealing that which before was intimate and internal. Even more potent is making the apparatus function in that state like a sick medical experiment.

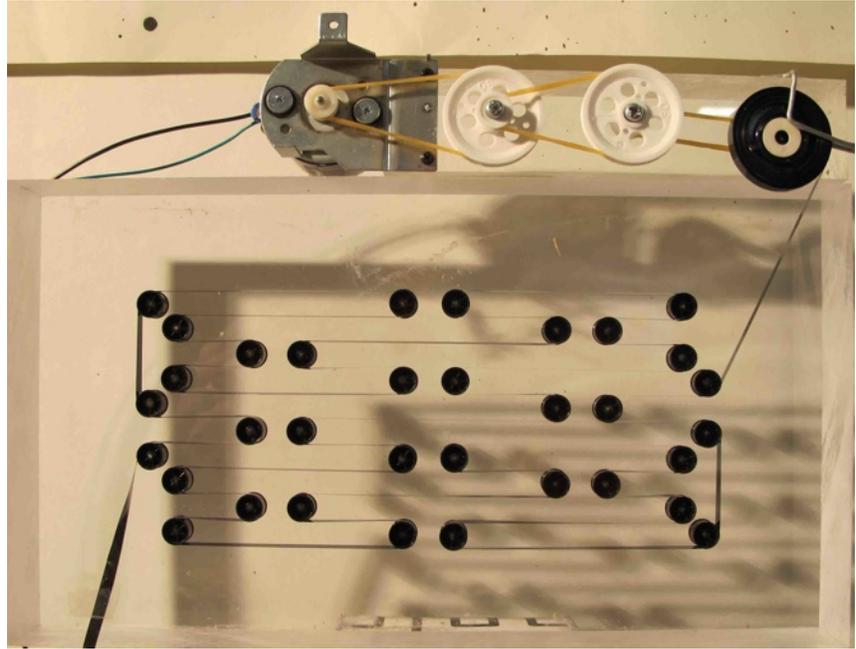


Figure 42. *Crucifixion I*, acrylic, audio tape, mechanics 10in x 8in x 2in

The first piece featured a random placement of pulleys. More intentionality was necessary in the path of the tape for subsequent explorations. Returning to the transfigured labyrinth designs used in the milled acrylic monoliths, I chose to work with a flat, rectilinear pattern derived from a Chartres labyrinth (see fig. 43). The visual rhythms and complexity are quite engaging. However, I felt the design was a bit static. I considered many variations of transfigured Chartres labyrinth patterns before deciding on something completely different. Of the generally recognized labyrinth forms, besides the Chartres labyrinth, there is the pagan or Cretan labyrinth pattern (see fig. 27). The visual component of my final sculpture titled *The Transfiguration of Julio Iglesias* is a direct representation of a Cretan labyrinth. This was an act of fully acknowledging the origin of the aesthetic base of my work.

As visually interesting and conceptually rich as these constructions were, making them work mechanically was essential. The process of designing a mechanism capable of pulling a practically non-existent film¹⁶ over dozens of quarter-inch diameter pulleys proved to be quite challenging. To overcome the friction compounded by so many moving parts required precision machine work. And a transmission was necessary to reduce the output speed and increase the torque of the small electric motor.

By experimenting with several approaches, I was successful at getting a mechanism to work with forty pulleys. Additionally, the mechanism powers the drive studs which turn the two reels inside the centrally mounted cassette shell (see fig. 43). It was very important to represent this aspect of the cassette as a nod to the authentic

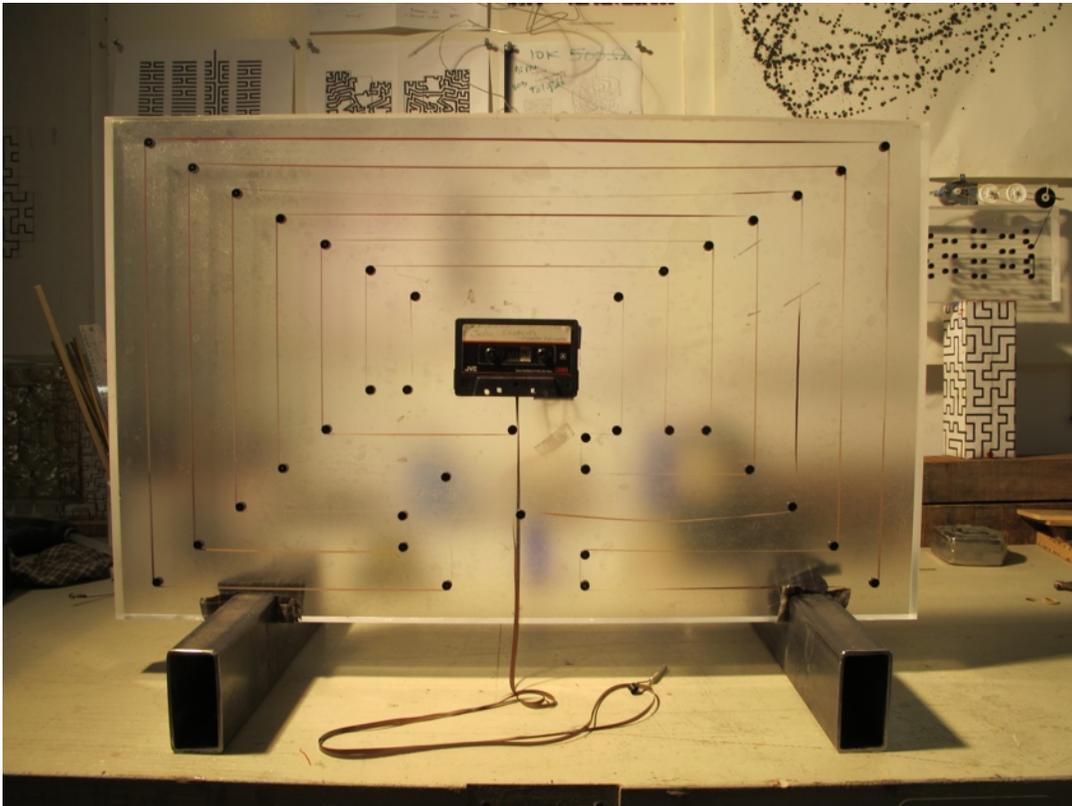


Figure 43. *Transfiguration of Julio Iglesias*, acrylic, audio tape, mechanics 27in x 17in x 3in

¹⁶ A standard audio cassette tape is only 16 microns thick – sixteen one millionths of a meter.

cassette experience. Undoubtedly, anyone familiar with playing cassette tapes would agree that the visual indication from these posts is essential.

For the typical cassette listener, seeing the drive studs turn the cassette reels is an important source of information about the operation of the cassette: was the program approaching the end of the tape? Was the tape getting eaten by the drive? What mode was active: play, stop, fast-forward, rewind? Watching those drive studs was also soothing. Who didn't fix their eyes on those turning parts as a place to rest the gaze while absorbed in experiencing "the best mix tape ever"?

A key feature of the final kinetic labyrinth sculpture is the transversal crossing where the tape path passes through the center of the inch-thick acrylic slab. This design allows the tape path to defy its own flatness by accessing a different axis to loop through itself. The cassette tape is the head and tail of the ouroboros alluded to in the work. Another detail that ties the piece to the sacred is the overall dimensions of the sculpture which conforms to the Golden Ratio of sacred geometry, that is 1:1.618.

Conclusion



My brain, like all mammalian brains, is a labyrinth - literally¹⁷. It generates labyrinthine thoughts which manifest visually as labyrinth artworks sometimes and conceptually as the written word other times. I've discovered my voice is a fairly complex one and I really enjoy playing with complicated words and phrases evocative of science and mysticism.

A note on the topic of scale with respect to the milled and electroformed objects. Some critical questions surrounded the intent behind the creation of these objects. Were they finished works, or models of larger works? In the end, I feel strongly that they don't have to be one or the other. These small highly crafted, handheld objects are interesting and engaging as presented. However, should the opportunity present itself to create much larger versions, columns for a facade as one example, I think they would scale up quite well. They don't have to be models to function in that way. It could be argued that any ambiguity existing about their *intended* scale suggests that they are readily imaginable as much larger. Enabling the viewer's imagination is a beneficial service of art.

¹⁷ Incidentally, a strand of DNA is also a folded labyrinth form.

The final work for this practicum manifest as an installation of several objects as originally intended. The concept was refined to three pieces in an intimate, dark space. Each finished work was chosen for its representative quality of either art, craft or design. The installation as a whole represents any successful creative endeavor which must satisfactorily unify these three modes.

This degree program challenged the students to critically examine the creative disciplines through the lenses of art, craft, and design. The modes were compared and contrasted *ad nauseum*. In the end, my original notion of the three was reinforced: That each is a mode, a subset of the whole creative process, and each must be considered thoroughly to arrive at an excellent result of any creative endeavor. In the simplest terms, I ascribe the influence of art to be strongest on the idea. Design most strongly influences composition and functionality. Craft influences the fabrication in materials and process. An object never exists as a manifestation of purely one mode. I reject the notion of an object that is purely craft, art or design. In the final work shown, titled *Ouroborum: Transfiguration of the Labyrinth*, the installation as a whole represents an internal space containing a conversation between art, craft, and design.

The realm of art is represented by the audio piece entitled *Dialecticum: Sound of a Labyrinth*. The work was produced in a recording studio using the minimum processing necessary to achieve a rich and mystical audio program as elicited from a steel labyrinth sculpture (*Labyrinth 110326*). I've associated art with the intangible, that is, an idea. And as an idea is immaterial, so is this piece representing it.

Design is represented by the object titled *Transfiguration of Julio Iglesias*. There's an idea behind it and many craft processes were employed in its creation. But to me it functions best as evidence of a design challenge. This work is less about a concept or a

masterful craft process and mostly about recognizing constraints in the designing of a functional machine. Some constraints included a limit to found materials (audio tape and slab acrylic), presentation of a moving labyrinth from audio tape, and minimal mechanistic intervention.

Lastly, the mode of craft is represented by the electroforming station - a behind-the-scenes look at the craft process itself of creating electroformed objects. In fact, the last pieces might be exemplary of *metacraft* - a craft activity that results in the creation of a tool or process that is or could be subsequently used in the crafting of a different object or objects.

A thought on the concept of labyrinths versus the practice of engaging a labyrinth for mediation or introspection. To be frank, I've always felt skeptical about the transformative effects reported by



Figure 44. Visitors walking the floor labyrinth at Chartres cathedral as has been done for 800 years.

those who engage them. The original myth of the labyrinth (i.e. built by Daedalus to house the Minotaur, transgressed and conquered by Theseus, etc) was wrought with fear. Every nine years, seven maidens and seven youths were sacrificed to the Minotaur via a one-way trip into the labyrinth. The Labyrinth was something to be feared.

The labyrinth journey ultimately represents conquering the fear of the known. This is precisely what is missing from the journey one takes walking a floor labyrinth (see fig. 44). Nothing is unknown besides the original reason for walking a labyrinth in the first place. I believe this may be the reason I've always distanced myself from associations with traditional labyrinths. But with the choice to represent a traditional Cretan labyrinth in *Transfiguration of Julio Iglacias*, I have acted to formally recognize the origins of my creative and philosophical interest in this archetype.

A significant element of *Transfiguration of Julio Iglacias* is its intentional engagement of time. With this piece I have invoked the concept of transdimensionalism through the dimension of time. Since the tape is a loop, a head/tail location can be indicated. Once identified, the loop's cycle can be observed. Only from that very precise time interval perspective can a horizon be observed.

Affixed to the tape surface are rectangular chrome signal markers. They represent beings traveling highways of space/time. Seemingly individual, they are also elements of a larger, interconnectedness represented by the tape. The transdirectional tape path represents what I call "confluences of energy." This principle based on my life observation that people come together then go apart, often repeatedly, throughout life is illustrated by the changing directional relationships of the signal markers. At one moment traveling in the same direction, at the next moment opposite.

Every eight-and-a-half minutes, the cycle begins again as indicated by a perfect, horizontal alignment of all markers. This horizon represents the great galactic alignment calculated by the Mayans to occur every 26,000 years. This is the astronomical event

behind the Mayan Prophecy that accurately predicts a perfect horizontal alignment between our solar system and the black hole that is the engine of our MilkyWay Galaxy.

§

Let us return for a moment to the audio recording of steel rod sculpture *Labyrinth 110326*. The studio equipment and art object were integrated. Sounds were coaxed from the form. Shortly thereafter, I felt inspiration. The built-in video camera of a notebook computer nearby was witness to what I like to refer to as “the Transfiguration of the labyrinth.” The term transfiguration means a significant change in form or appearance. Metamorphosis is a synonym.

There can be no doubt that my labyrinth drawings have been transformed when considering the succession from flat, two-dimensional drawings; to sculptural three-dimensional pieces; then again into a labyrinthine sound experience. But the term *transfigured* is more fitting due to the spiritual and philosophical ramifications of the word. In the Western Christian tradition, *Transfiguration* refers to the precise moment when Jesus reportedly received the spark of godliness. The three disciples present reported his glowing white garments and a sunny, golden shine from his face. This aptly illustrates another meaning of transfigure which is “an exalting, glorifying, or spiritual change.”¹⁸

I feel my work for this practicum has very successfully satisfied its ultimate stakeholder: the Labyrinthine Projection technique itself. I labored over a meaningful

¹⁸ <http://www.merriam-webster.com/dictionary/transfiguration>

client relationship but, none seemed a proper fit. I considered and made progress engaging the VA hospital, the International Labyrinth Day festival at Marylhurst University (May 7, 2011)¹⁹, and the Labyrinth Network Northwest²⁰. All were receptive, but something deeper within me resisted.

Through this practicum I learned that labyrinths represent a great deal of emotional and psychological density form me. I am consumed with a curiosity surrounding this archetype. As Joseph Campbell says, “All great symbols and archetypes . . . speak to us not directly but via the language of poetry, through metaphor and multiple layers of truth.” (Westbury 9) The labyrinth itself was the client. The client input that directly affected the work and results was the published constraints of the Labyrinthine Projection.

Beyond any academic satisfaction, the greatest feeling comes from such a remarkable breakthrough. Using the material labyrinth form to create an immaterial likeness of itself is a true Transfiguration in both denotation and connotation. Considering this work has a spiritual quest surging beneath it, I know have touched my future with this endeavor.

¹⁹ <http://www.marylhurst.edu/calendar/20110507labyrinth.php>

²⁰ <http://www.labyrinthnetworknorthwest.org/>

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Works Referenced

- Arnason, H. H., and Marla F. Prather. *History of Modern Art (Trade Version)*. 4th ed. Prentice Hall, 2003. Print.
- Battistini, Matilde. *Symbols and Allegories in Art*. 1st ed. J. Paul Getty Museum, 2005. Print.
- Bosbach, Stephen. "Mind Mirror Measurements At the Levi Labyrinth". *Mid-Atlantic Geomancy*, 12. 1998. Print.
- Cirlot, J. E., Translated From the Spanish By Jack Sage, *A Dictionary of Symbols, Second Edition*. Dorset, 1991. Print.
- Cajori, Marion (Dir.). Chuck Close: A Portrait In Progress. . Muse Film and Television/ The Art Kaleidoscope Foundation/Thirteen/WNET, 1997. DVD. Home Vision Entertainment, 2003.
- Field, David J., Anthony Hayes, Robert F. Hess. "Contour Integration by the Human Visual System: Evidence for a Local 'Association Field'". *Vision Research*. vol. 33. no. 2. 1993. 173-193. Print.
- Franz, Marie-Louise Von. *Alchemy: An Introduction to the Symbolism and the Psychology*. Inner City Books, 1981. Print.
- Gombrich, E.H. *The Sense of Order: A Study in the Psychology of Decorative Art*. 2nd ed. Phaidon Press, 1994. Print.
- Goodstein, Laurie. "Reviving Labyrinths, Paths to Inner Peace. (Walking the Paths of Labyrinths as a Form of Meditation, Prayer or Emotional Solace)." *New York Times*. 10 May 1998: Web.
- Harris, Neal. "Effective, short-term therapy: utilizing finger labyrinths to promote brain synchrony" *Annals of the American Psychotherapy Association*. 5.5, Sept-Oct 2002. p22-3. Web.

Hughes, Robert. *SHOCK OF THE NEW The Hundred-Year History of Modern Art: Its Rise, Its Dazzling Achievement, Its Fall*. Alfred A. Knopf, 1981. Print.

Kandinsky, Wassily. *Concerning the Spiritual in Art*. Dover, 1977. Print.

Martin, Agnes et al. *Singular Forms*. illustrated edition. Guggenheim Museum, 2004. Print.

Pagnini, Francesco et al. "The Efficacy of Relaxation Training in Treating Anxiety." *The International Journal of Behavioral Consultation and Therapy*. 5.3-4 (Fall/winter 2009). p264(6). Web.

Pye, David. *The Nature and Art of Workmanship*. Revised. Fox Chapel Publishing, 1995. Print.

Roob, Alexander. *Alchemy and Mysticism: The Hermetic Museum*. Taschen, 1997. Print.

Tansey, Richard, Fred S. Kleiner, and Horst De LA Croix. *Gardner's Art Through the Ages*. 10th ed. Harcourt Brace College Publishers, 1995. Print.

"The Labyrinth Society: Labyrinth Research Bibliography." www.labyrinthsociety.org
<<http://labyrinthsociety.org/research-bibliography>> Web. accessed 12 Nov. 2010.

Westbury, Virginia. *Labyrinths Ancient Paths of Wisdom and Peace*. illustrated edition. Da Capo Press, 2003. Print.