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Reconstructing Nature

Benjamin R. Caras
University of Massachusetts Amherst

RECONSTRUCTING NATURE

A Thesis Presented

by

BENJAMIN ROBERT CARAS

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Art

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Approved as to style and content by:

_____
Jeremy Boyle, Chair

_____
Dale Schlappi, Member

_____
Alexander C. Schreyer, Member

_____
Jeanette Cole, Graduate Program Director
Studio Art Program
Department of Art

_____
William Oedel, Department Chair
Department of Art

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CHAPTER 1

INTRODUCTION TO PRESENT WORK

I want to talk about my current work from the perspective of my process, which is one of challenge, change, and evolution. My methods of thinking about and making art are constantly in flux. My critical methods need to be considered in the same fluid way – ideas are not a constant, they are part of my process and are always evolving, developing and growing. My process is driven by my continual desire to satisfy my curiosity for the "what if". It is the big "what if" that keeps my work alive. I need to work in a way that continually challenges me or I risk stagnation. Hearing "you can't do that" only fuels my need to explore processes, materials and ideas. I believe that this thought process stems from my need to express myself and my creative and technical abilities sometimes in the face of others doubt.

Throughout graduate school at University of Massachusetts, I have worked in many different directions and explored many new bodies of work. Though my work has often evolved in giant shifts, the commonalities between my many different, seemingly disparate, methods and styles of working have become much clearer and cohesive. It is my most recent shift, with my interest in digital design and production that has most profoundly developed and articulated this continuity. A certain dissatisfaction has been created by the conflict of my passion for the materials and process that I work with and the ambiguities of my profession. I have found it is not productive to make work purley with the intention of fitting into a context or that is

driven by a particular meaning or concept. I have found that I am most challenged by analyzing the process of my own development and it is this process of reflection into my work that has allowed me to develop a much more complex understanding of the meaning of my work. Within my process I have discovered many new facets about myself as well as new and unusual materials, techniques and ideas. I tend to be highly critical of my own work, deconstructing and understanding what I have done after the work is made. It is this act of deconstruction that usually catalyzes the next necessary shift/evolution in my work. It is my strong curiosity, interest and desire to explore and develop that allows me the freedom to go in new directions. It enables me to find future potential for materials, ideas, and process.

CHAPTER 2

POLITICAL FRAME

Though not overt, I find there is a political framework that my work exists within that is very significant. When it comes to political or social subject matter, I don't find it is effective to simply be passive and "pointing".. It is easy to be a critic and passively declare all of the wrongs of the world: we know what they are, we've known for a long time, and yet it seems that things don't change. As someone who is politically and socially minded, I would like to take another approach with my work: to be an active participant in the political discussion, proposing solutions and solving problems, not just passively pointing them out. My current work is a direct reflection of this participation in problem solving among contemporary socio/political conditions. This body of work is the act of proposing solutions for the challenges I set before myself , putting those proposed solutions into action, and finding whether they are successful. I don't accept as a given that any proposed solution will be a success – I continue to question and develop and respond to new sets of challenges. In this way, my work demonstrates what can be possible through the process of analysis and problem solving. From a politically active stance, I am not saving the world, but I am proving that the world can be saved.

CHAPTER 3

PERSONAL EVOLUTION

Until graduate school I was making work that co-mingled the ideas of industrial process and organic form. Working mostly in metal, I enjoyed making simple renderings in materials or compositional arrangements. The work was successful, aesthetically pleasing, and drew the viewer in. As I progressed technically and artisticaly, my need for more elaborate technical solutions grew. I began building the equipment I needed to approach new processes. I started with simple devices to help me pattern difficult shapes, and evolved to making complex metal forming equipment that required considerable skill to design and build. It is these times in my artistic process of building machines that I found the most challenging and rewarding. When I began graduate school I concentrated on the same learned conventions of art making, but that left me unsatisfied. Eventually, as an exercise, I decided to analyze the knowledge and skill I have learned over the years, discard old values, and metaphorically sift through the deconstructed parts to rebuild them into new ideas. This created a freedom that allowed me to explore new worlds and find new solutions. During this time of exploration, I worked with many new creative endeavors that seemed disparate and unrelated, but shared the common theme of “use what you have around you.” I made giant inflatable structures. I made video art that followed current trends and experimented with new methods. I exhibited a show, “House of Cards”, in which I created a space where the viewer became the artist and designer activated by the availability of free material and facilitated by daily

involvement and demonstration with viewers. What I didn't realize at the time was how much each of these works were all relating to each other. The elusive commonalities between these works and so many of my previous work were now clear. For each I had to build tools to aid in the making of my art, and these tools were made from what was readily available, not purchased.

In spring of 2007, my work made another significant shift. I studied CAD and the history of digital production methods. By the end of the semester CAD had influenced me in such a way that it had completely changed the way I design objects and the way I see and consider space. Along with this shift came the possibility of utilizing digital production methods to produce some of the artwork that I had designed. As I researched companies where I could outsource cutting, I realized that to build even one of my ideas would cost me at least $1000 for these services. This cost represented a considerable amount of my resources and the outsourcing of production was something that I had never done. This led me to the idea, ”If it would cost $1000 to make just one piece, then maybe I should spend more and buy a machine to cut the required pieces myself?”

After more research, I found the cost of purchasing a CNC plasma cutter to be far out of my graduate student budget. Then, I found Hobby CNC. For less than $300 I bought a simple kit with hopes to configure it to function with my plasma cutter and stay within my budget. The advice I got from them was basically "this kit probably won't be able to run a plasma cutter.” It was at that moment the floodgates opened

and the challenge set before me was known, fueled by improbability, possible impossibility, and others' doubt. My frustration and motivation led me, not into a black hole of failure, but toward an explosion of ideas and a powerful new way of seeing and expressing creativity and production methods.

This show is the culmination of these challenges and a massive creative singularity: The Big Bang; The inspiration of building my own CNC machine to allow me to output the forms I wanted without using outside sources. It has taxed every skill and process I have ever learned: fabrication, electronics, robotics, mechanics, engineering and artistic output. It has pushed me into new patterns of thought. It has honed my skills to a new degree of precision. It has allowed me to see materials in a greater degree of detail. It has shown me that the skills I hold so dear are the same skills that identified my forefathers. It has opened up the realm of possibility that the creative process of building machines to help me build art is the art. It has allowed me to work unhindered by the binds of engineering and has allowed me to use “mechanical improvisation” to find my way around expensive parts and process. These are the elements of my current mindset in art making and the basis of my work here.

CHAPTER 4

INDUSTRIAL PIONEERING AND FAMILY EVOLUTION

The act of building the tools I need to accomplish unique processes, like my foray into CNC technology and tool making, is nothing new to my family or the pioneers of the pre-industrial revolution. Historically, a craftsman would settle in a place bringing with him only a small tool chest of essential equipment. He would build his first machine (usually a foundry) which would in-turn allow him to build his next piece of equipment, (usually forging tools and an anvil). With these tools he could now build a lathe. The lathe's ability or utility to cut precise and important shapes (like machine screws and guides) allowed for the design of milling equipment and tooling. This is the basis for modern machine work. One tool begot another, each leap paving the way for another, as each advancement led to the next. My great grandfather was one of these pioneers, with successive generations to follow his lead.

At the time of great grandfather's immigration, metal crafters had a long tradition of sharing ideas and advancements. These industrial pioneers knew nothing of intellectual property or proprietary knowledge. They all inspired each other to advance the state of the art. It was about survival and self-sufficiency – and they realized they needed to share ideas to achieve this.

My great-grandfather immigrated to this country from northern Europe in the late 1800s. Legend has it, he was a second or third generation blacksmith. He settled on

our family's homestead in Mt. Vernon, New Hampshire before World War I, where he was known as a local smithy, farmer, and family man. It was here where my grandfather, Chet, had his first experience with metal. Chet's curiosity with metal led him to study Metallurgy and tool-making at the famous Thomson Island Farm and Industry School. He went on to start and run a state of the art metal stamping and industrial tool and die factory in Belmont, MA that was started with the industrial boom during World War II. It was there where he conducted research and development for cutting edge tool design. Over the years he patented several processes that revolutionized the metal stamping industry.

In 1966 my father, Robert, (from the other side of the family) went to work for Chet, learning from the master machinist his techniques and developments. After years of working for Chet (and marrying his daughter), my father's thirst for aesthetics drove him to start his own architectural metal fabrication shop. This is where I enter the family story. Through my father and grandfather, I have been in the metal industry my entire life. As a child I remember visiting my grandfather's metal stamping shop, and from my teenage years until now, I have worked for my father in his architectural fabrication facility.

After recent introspection into my family's history in the metals business I have realized the commonalities and cycle's that bridge the generations of metal crafters in my family. Each successive generation has taken the craft to a new level and on a different direction. It is here where my first ideas of art were formed and allowed me

to influence the direction and possibly the destiny of future generations, raising the bar of knowledge like my forefathers. Metal runs through my blood. It has run through the veins of my father, grandfather, his father and his father's father. As I have discovered, it is my destiny and possibly the destiny of my children.My proud heritage is reflected in my work and in my need to further my own knowledge and push this material and technique as far as I can.

CHAPTER 5

TOOL BUILDING: CREATIVE CURRENCY, MACHINE BUILDING, EFFICIENCY, AND POLITICS

As I dove into this exploration of CNC process and began to gather materials, I came across Hobby CNC (www.hobbycnc.com). Hobby CNC offered an inexpensive "kit" (3 stepper motors and instructions to build a control board) that you could apply to simple machine tools. The instructions were vague and offered no guarantee of success. However, they did invite each customer to join the Hobby CNC internet user group. Every day a digest is sent to each user where questions are asked and answered by other customers/users of the Hobby CNC products. I found this an amazing and (contrary to capitalist mindset) powerful resource. Even though the owner of HCNC moderates the discussions (to keep people on subject) he rarely needs to chime in, usually only to furnish technical info or to settle discrepancies.

Essentially, each member becomes a technical service representative. When a question is posed all users have a chance to answer, provide advice, recommend solutions and share experiences. Instead of having to rely on inadequate and inefficient customer service, a knowledge base of thousands of experienced users helps each other to ultimately further CNC technology. It reminds me of those industrial pioneers of my grandfather's generation and their collective sharing of knowledge that allowed for massive strides in metal technology.

All of this knowledge and understanding of my past and the past of industry has led me to a fundamental question, “Is money the only way to solve problems?” The answer that we are taught in these times is “Yes. It is.” As a person of limited means, like many of us, this answer is an intimidating and depressing one. But sifting through our experiences and finding the right pieces to the puzzle we can solve problems without money. It is this specific concept that I want to share with the world through my work: If we work together and share ideas, we can accomplish anything.

Many problems can be solved using money, but how do you use inspiration and idea to achieve the same result that loads of cash can accomplish? How do we solve what seems to be insurmountable problems by working together? I have no answer for these huge questions but I can share my own experience and hope it inspires others to think outside of the box. I have a unique ability to achieve accurate and professional results without spending much money. For me, the act of mechanical improvisation is art. Some might consider it “Hack” work or work of the untrained, but seen under different light, it is work of necessity and creativity. It becomes “creative currency”. It has value. It reminds me of how simple machines are made in isolated African villages to pump water or grind grain, how a sailor with a broken mast rigs up a temporary solution to get his vessel home, For these people mechanical improvisation was necessary for survival. I find that being able to bypass expensive processes or parts can be as gestural as the most beautifully drawn lines or painted strokes - this process is my art. It is amazing to see what people have mechanically

improvised to reach a solution. For me mechanical improvisation is about saving money and utilizing diverse skill to build what I cannot afford or, in essence, survival. It makes more sense for me to spend 20 hrs to building something that would take 100 hrs of work to buy. Where is the difference? What does it all this mean? For me it stems from the need to be self-sufficient.

CHAPTER 6

ARTIST SELF-SUFFICIENCY

As an artist I must solve problems, sometimes layers of problems, before I get to the solution...the gesture. I realize that the most creative moments of my life have happened during the problem solving process of building tools. The machine that I have built helps me make digital art, but I find the primary art is in the act of building the machine. I would hope that all artists apply this kind of thought to their work. As artists, we set up problems and work hard to address them. If we must rely too much on others or on money we are not self-sufficient.

Approaching artistic process in this self sufficient way is nothing new, but often it seems displaced by the act of pure conceptual art. Conceptual artists, especially those privileged with financial support, have at times solely offered the concept, or idea, and have determined the process of art-making to be secondary, something extraneous that can be done by another party without compromising the artist's integrity. Impressive contemporary art is produced this way, however in some cases, the absence of the artist's hand in production seems to shine through. Artists working at the level where they are constrained by a budget must be self-sufficient and rely on themselves to create and produce. The intent of my latest work is to discusses these ideas and remind artists that the problem solving process is essential to the realization of the work as a whole. We must solve problems, sometimes layers of problems, before we get to the gesture of perfect expression.

I find it a socio/political/economic statement that I can achieve results without money (because of my limited resources). I achieve out of creative necessity. For example, the cost of having one of my large-scale shell forms cut by a professional would be $1000. But with ingenuity, patience, an open mind and versatile skill base, I was able to build a machine capable of cutting countless forms for less than $750. Now I have the machine and the ability to cut anything I can draw in CAD, which is an invaluable resource in the production of my work, much more valuable than spending the same economic resource to have a singular piece produced.

CHAPTER 7

MECHANICAL IMPROVISATION

During the process of building these inexpensive machines to aid in the production of my art, I tend to improvise expensive mechanical components with parts and components that I have previously collected. Given that I am using mechanical improvisation for the pursuit of art, I see it as an extension of "found object" art. I use what I have around to make an assemblage that becomes a tool. I use mechanical improvisation to work around complex problems. "What do I have at my fingertips that will accomplish the same result?" It is surprising what can be accomplished when mechanical components are re-contextualized into new and different functions.

During the process of building the CNC plasma cutter I found many simple, inexpensive solutions for complex and expensive components. Linear guides provide precision linear movement, the kind of movement needed to slide a gantry across a table. I found that linear guides would have cost close to $1000 for what was required for the cutter's table. Instead of taking this standard approach, I used extruded aluminum rectangular tubing which is known for its consistency and straightness. Once encapsulated with a linear slide made with skateboard wheel bearings, I had the mechanical components with the same function, replicating the linear guides with less expensive and easily procured materials. It works just as well, but at a fraction of the cost. This is an example of just one of many mechanical improvisations I used in the production of this machine.

CHAPTER 8

OPEN AND CLOSED LOOP SYSTEMS: BREAKING OUT OF THE CLOSED LOOP SYSTEM

In my experience with CNC I have learned a lot about the function of open and closed loop systems and realized that the essence of these systems permeate life in many ways. CNC systems work within one of two systems: servo control (closed loop) and stepper control (open loop). Servo motors operate with a sensor that constantly feeds back to the controller the exact position of the moving parts. In essence, this closed loop system always "knows" where the stylus of the machine is. In an open loop system, stepper motors are used to accomplish the same movement without feedback. Essentially you must trust that the machine will not malfunction or over-run its boundaries. These CNC systems accomplish the same thing, however the cost and complexity of servo control closed loop systems are two-fold. Servo motors are considered superior, but only to an untrained user. If the user understands the open loop system they can foresee problems before they happen. Understanding and using these concepts during the building of this project has brought to light these systems in many facets of my project, and also in life. Stepper control motors, non-proprietary information exchange, and open source software are all examples of open loop systems.

The Hobby CNC user group serves as a model for open loop systems but is also an organic knowledge base - a living organism whose system grows and develops

specifically to solve problems. It is a matrix of brains working together to expand its knowledge base and participants. The opposite would be a company that makes you pay for information and service (we have all experienced this with poor customer service only accessed through a maze of automated tech-support systems over the telephone). Patent and idea control keeps the collective knowledge base small and separate in the closed loop. If we could have unlimited access to information and ideas, like the HCNC user group, imagine what humanity could accomplish.

CHAPTER 9

THE MEANING OF FORM: THE BIRTH AND GROWTH OF IDEAS LINKED TO THE SHELL FORM

The shell form continually finds itself in my work**.** I find shelled creatures to be beautiful and amazing, whose built exteriors are pure perfection, with their form dictated by the environment, function, and the shape of their body(form follows function). I have studied these forms for many years and have found that they can communicate volumes of physical and conceptual meaning. In this case the form of a shell, interior and exterior, represents metaphorically how I perceive the structure of ideas, problems and solutions. As I work and create, I notice ideas evolving and growing logarithmically. The problems I set up for myself become thicker, more layered, as I work through them toward detail. I can relate the metaphorical structure of ideas and my creative process to the shell form. It begins as a moment of inspiration,a singularity appearing in the darkness, growing around itself, as details and process emerge. Each revolution not only records, but amplifies and magnifies the problem solving process, expanding like fractals.

The interior of a shell represents to me a metaphor for the problem solving process. One enters a shell form from its largest opening and heads toward the initial point of conception. Each detail must be clarified by ever-finer details. It is the reverse of fractal expansion. As the design/build process takes over from the initial conception, one “goes down the rabbit hole”, dealing with each detail, and solving each problem,

heading again towards the singularity; the origin of the idea. Compressing, editing, and revising each step as the process resolves itself. It is this process, recorded in a shell form, that is the essence of this current work "Reconstructing Nature"

CHAPTER 10

CONCLUSION

I understand that ideas are only as viable as the physics that bind them. If one knows and understands these laws and the nuances of available materials, then the visualization of ideas brings them to reality and possibility. The filter of physics and understanding allows for accurate and successful visualization. My drive to understand physics, manipulate materials and create objects and structures has driven me into other, related creative realms. I believe that the act of building the machinery I need to accomplish artistic tasks is the art itself as much as the beautiful object that is rendered. In the end, process cannot be separated from product.

As I emerge from this study of art and continue my practice in the future, I would like to share what I have learned from my commitment to participating in artistic process. My goals as a practicing artist involve my own artistic development, involvement with the greater community, and continued exploration of technology and re-usable materials that apply to our current and future world. I would also like to make connections with other artists and form collaborations within media that is new. I want to introduce CNC processes to media that I am less familiar with, like painting and printmaking. Being part of a collaborative space, while maintaining my sense of individual creative space, will be an essential component of my move to integrate self-sufficiency and community outreach in an active and perpetually changing environment. I strive to develop a sustainable studio practice, to share my work in dynamic gallery spaces, and to contribute to the community. I hope to bring an

under-utilized understanding of digital practice and CNC technology to broad contemporary ideas of studio practice.

I have been invited to participate in The Island Project, an ambitious international art collaboration on the abandoned islands speckling Ireland's Galway Bay. Founded in 2002, The Island Project seeks to bring awareness and ongoing artistic exploration of this fleeting history. My work with this project will involve exploring the utility of the island's abandoned structures as material to build and sail an "escape vessel," and to document the process. It is placing myself in the position of necessity, as an experiment, to challenge and test my abilities under different context. This project will provide opportunities for me to utilize problem solving in combination with mechanical improvisation in a dynamic collaborative environment. I am very excited for the discoveries and new directions that this will bring to my work. In this project and in future endeavors, I will explore my collaborative interests, invest in and develop community, utilize processes of re-use and re-creation, all within the exploratory nature of my work described in this paper. I am looking forward to engaging in this process and arriving at the next evolution of my work.

TECHNICAL INFORMATION

A. Hand built CNC Plasma cutting machine made from found and easily attained components: Made from extruded aluminum, mechanical components, electronics, and a Linux based PC running EMC2 machine control software

B. Digitally designed metal sculpture made with the CNC plasma cutter inspired by sea shells and other forms: Fabricated from steel, aluminum, copper, brass using contemporary metal fabrication techniques

C. Hand formed metal sculpture taking on the form of abstracted bodily organs: Fabricated from steel, aluminum, copper