2-3-2: PAPER-METAL-PAPER

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MASTER OF ARTS

BY
KATHRYN E. MCELROY

BALL STATE UNIVERSITY
MUNCIE, INDIANA

ADVISOR: PATRICIA NELSON

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CHAPTER ONE

STATEMENT OF PROJECT

How do we view paper? Most people would say disposable or trash and would complain about how much paper is wasted on all sorts of advertising. Many people would not even realize how much paper they use and waste every year, a staggering 700 pounds. How do we view the dimensionality of paper? Most commonly it is only seen as a flat, two-dimensional sheet. For me, change in dimension was interesting, especially when working something inherently 2-dimensional into a 3-dimensional sculpture or object.

For my creative project, I created a cycle by making sculptures out of flat paper, allowed the paper forms to inform enameled, copper sculptures and wearable jewelry, and then translated those colorful metal pieces into two-dimensional graphic designs printed on paper. After years of working in architecture, my artwork broke free from past rigid structures and became fluid, moving, and organic. I enjoyed further exploring these natural forms in paper and pushing them into the medium of copper. I also advanced my knowledge of the electroformer and enameling to make colorful copper objects directly from paper sculptures. Based on these copper sculptures, I created graphic images in patterns that enhance the artworks in my exhibit, both paper and copper thus bringing the cycle to a close. I printed and framed the graphic images for the final exhibit. I could also have used
the final prints to begin the next cycle or used it as a direct pattern for the next paper sculpture. I finished three full cycles for my creative project with additional copper and paper objects and images to support my exploration into electroforming and enameling. Through these finished cycles, viewers will be forced to look at advertisements that are thrown at them every day in a different format and will begin to comprehend the wasted paper and its potential to be something beautiful.
CHAPTER TWO
REVIEW OF INFLUENCES

A variety of artists were influential with their mastery of electroforming techniques, use of common household objects, creation of large-scale sculptures, and the organic, flowing forms that result from these factors. I also researched electroforming and enameling in depth to fully understand the processes and better execute my designs in copper.

**Artists**

June Schwarcz

![Harlequin, 1995](image1)
![Herringbone Silver, 1990](image2)
![Rothko, 1991](image3)

June Schwarcz provided a wonderful example of mastery of electroforming, especially on copper foil. Schwarcz is an innovator in her field and has developed new ways to create vessels and texture with electroforming. Schwarcz was born in Denver, Colorado in 1918. She studied at the University of Colorado, 1936-38, the University of Chicago, 1938-
39, and Pratt Institute, 1939-41. Her enameling techniques were largely self-taught with help from books by Kenneth Bates, such as *Enameling, Principles and Practices*. She experimented with enameling over etched surfaces in the beginning of her explorations, but soon added electroforming to create an additional layer of depth in her pieces. Most recently her work is focused on vessels: stitching them with copper wire, creating texture in copper foil which is enhanced by the electroforming, and enameling over the finished pieces. Her history in sewing allows her to create paper patterns that she then cuts out in copper foil and sews together before electroforming.

Lisa Hoke

Lisa Hoke inspired me with her use of color and everyday objects to create overwhelming large-scale installation artworks. Some of her work, including *Gravity of Color*, covers entire walls with colorful patterns made out of discarded material. Hoke received her BA from the University of North Carolina, 1970-74, received her BFA from Virginia Commonwealth University, 1975-78, and attended Florida State University, 1979-80. Hoke’s
curving, organic lines and patterns are made with relatively linear materials such as plastic cups, zippers, and drinking straws. She makes site-specific artworks and always has an emphasis on color and the emotions that it can produce.

Tara Donovan

Tara Donovan’s artwork has been an interest of mine from the beginning. Her ingenuity with everyday objects is apparent in the massive installations and the quantity of materials she uses to make her artwork. Donovan was born in New York City, NY in 1969 and continues to live and work there. She began her studies at the School of Visual Arts in NYC, continued at the Corcoran College of Art and Design where she received her BFA in 1991, and received her MFA in sculpture from the Virginia Commonwealth University in 1999. Donovan creates massive installation artworks out of an assortment of objects such as Styrofoam and plastic cups, clear Mylar, receipt tape, buttons, toothpicks, and metal pins. I’ve had the pleasure of experiencing her artwork up close multiple times, and the organic shapes and massive scale are impressive. Donovan has created a new form of artwork from
such mundane and commonplace household objects which is what I aspire to do with my paper sculptures.

Marimekko

Marimekko is a Finnish print and fabric design company. Its designs are forward thinking, simple, and colorful. Their fabric influenced my print pieces, especially the graphic design piece for Fashion. The company began in 1949 when Vijo Ratia and his wife purchased a printed fabrics company, Printex. They commissioned local artists to create new, bold fabric designs. The couple then started a separate company, Marimekko, to sell products made with the new fabrics in order to establish the brand and to make the innovative prints more acceptable to the public. Their fabrics are still popular today with new designs and products, as well as their original designs, being sold all over the world.

Techniques

Electroforming

Electroforming is the process of building up a metal surface, through molecular deposition, on the electroconductive surface of an object, or matrix. This process creates layers of metal over the surface of the matrix. A thin layer of metal is called electroplating, and the matrix is usually a permanent part of the finished piece because the layer of metal is
too weak to exist on its own. A thicker layer of metal built on a removable matrix is called
electroforming because the structure and actual form of the final piece is completely built
with the metal molecules. The matrix is removed by melting, if it is wax, or burning, if it is
paper. To electroform, one must have a prepared matrix and a set-up for an electroforming
bath. In the following paragraphs, I will explain each part in detail and also discuss some
common complications with electroforming.

The first necessary part of electroforming is the matrix. This object will be the basic
form of the finished piece, like the flower for Fashion. The matrix can be any material that is
sealed, or waterproof, and is either metallic or painted with electroconductive paint. Typical
materials for a matrix are wax, metal (if it is to remain a part of the final piece), plastic, or
paper. Porous materials, such as paper, need to be sealed so that the electrolyte bath does
not break them down, contaminating the bath and ruining the form. I sealed my paper
sculptures with basic spray paint, protecting the inner paper and creating a plastic, non-
reactive finish for the bath. Non-metallic matrices need an electroconductive finish to attract
the metal ions and are painted with electroconductive paints, such as Safer Solutions or EFS
Electro-base. I painted the paper sculptures on only one side so that I could easily burn off
the paper after electroforming.

The electroforming bath is made up of many parts including: the electrolyte bath,
anodes, a rectifier, and a filter or agitator. The electrolyte bath allows the metal ions to move
freely from the anodes to the matrix. It is a different chemical composition for each metal,
but a common copper bath recipe is: per three liters of distilled water, add approximately
165 ml of sulfuric acid and 500 grams copper sulfate. The bath must be clean of
contaminates such as foreign chemicals or incompatible metals and regularly checked for
buildup of copper sulfate along the bottom of the tank. The anodes are the source of the metal ions, for example: pure copper nuggets. They are hung in metal containers on the outer two copper bus bars with the matrix hanging by copper wires from a third bus bar in the center, giving equal deposition. The rectifier is a machine that both transforms alternating current to direct current and controls the current’s amperage and voltage. It has three sets of wires and clamps, two positives that attach to the anodes, and one negative that attaches to the bus bar with the matrix. These currents force molecules of copper to move from the positive anodes to the negative matrix. The final component is the filter or agitator that helps maintain the bath and keeps the electrolyte mixed evenly.

Before electroforming, the matrix must be completely cleaned of any foreign chemicals or oils on its surface. These contaminants can prevent copper molecules from adhering to the matrix and could potentially harm the electrolyte bath. The matrix needs two or more copper lead wires tightly attached to its surface to connect it to the bus bar and the current. The bus bars are suspended over the electrolyte bath with the matrix and anodes submerged in the liquid. Once the matrix and anodes are in place and the rectifier’s wires are connected to the bus bars, the rectifier is turned on and adjusted to 2-3 amps to begin electroforming. Depending on the size and form of the matrix, electroforming can take a few hours or a few days. After the electroforming is done, the matrix must be fully rinsed to rid it of all the bath chemicals. The lead wires are removed and the inner core is either melted out (wax matrix) or burned off (paper matrix). The final metal piece can then be patinated or enameled to create color on the surface.

Many complications can arise while electroforming from choosing an electroconductive paint to problems during electroforming such as bath inconsistency or
uneven build-up. Many older electroconductive paints were toxic and needed organic solvents to thin them enough to paint onto a matrix. The original paint I used on the paper sculptures was EFS Electro-base which required methyl ethyl keytone (MEK) to thin and paint. These organic solvents can be extremely hazardous to one’s health. After a few uses, I decided to switch to Safer Solutions, a water based electroconductive paint, for the remainder of my sculptures. Not only does it contain less harmful chemicals, but it also needs only distilled water to thin. This paint was a much better way to make my paper designs electroconductive.

The bath complications took much time and patience to figure out and clean up. The original bath was not plating properly when I began electroforming. Large deposits of copper sulfate had built up on the bottom of the bath, meaning it was no longer dissolved in the liquid and would not allow metal ions to move through the bath. After breaking up the growths, the bath still did not plate well, and a sample was sent to be analyzed by professionals. The results were astonishing: the 70 gallon tank was overwhelmingly acidic and needed 65 lbs of copper sulfate to bring the bath back to balance. After the extra chemical was added, the bath plated normally and was much easier to maintain by daily stirring and adding more distilled water as it evaporated out of the tank. Another problem I dealt with was a bumpy surface due to uneven deposition of copper. In general, peaks and points on an object will build up faster than valleys and depressions, but the development of nodules or spherical bumps along the edges is due to the amperage being too high and trying to electroform too fast. To create a smooth surface, the amperage on the rectifier should be very low, 2-3 amps, and will take longer to build the final surface. By rushing this process, one will get an uneven surface and a disappointing final result.
Enameling and Patinas

Enameling is the process of applying powdered glass to a metal and heating it to a high enough temperature that the glass melts and fuses to the metal. It is a wonderful way to add color to a metal sculpture. Many different types of enamel allow endless possibilities of color combinations. Enamels come in transparent, translucent, and opaque varieties and almost every color imaginable. For my metal sculptures, I used a base coat of opaque White 1010 and multiple firings of translucent colored enamels to create the correct shades. There are many methods of enameling based on the enamel’s relationship with the metal.

Cloisonné is the oldest form of enameling, dating back to ancient Greek times, and uses flattened wires to create cells forming an image or pattern that are then filled with enamel. The final composition is stoned smooth with the wires still showing between the different color compartments. Champlevé is the method of gouging out areas of metal and filling the voids with enamel and was popular during Gothic times for use on carved statues. Today, metal smiths use etching to recess areas on the metal that they fill with enamel. Plique-à-jour is the technique of enameling in an open latticework design so that the transparent enamels allow light through, creating a stained-glass effect. The design for this type of enameling must allow light to enter both sides of the piece so that the enamel can be fully appreciated. Basse-Taille process is the firing of transparent enamels over a carved metal surface. This technique allows the craftsman to create a detailed carving on the metal before adding delicate layers of enamel and resulting in a smooth, glossy finish similar to crystal. Another method of enameling is the Grisaille process for which only black and white enamels are used. After a background of black enamel is fired, the craftsman slowly builds up layers of white to create images, scenes, and portraits. Limoges is the simplest form of enameling by
applying enamel without anything separating the different colors. It does not require any additional metal wire and can create a multitude of effects by applying overlapping enamels. These methods of enameling have been in use since as early as the 5th century B.C. and the use of enamel is still evolving and changing in the present day.

For my metal sculptures, I used a very basic limoges enameling method because I wanted to have solid colors, but no lines or wires separating the colors. I began by thoroughly cleaning the sculptures in a pickling solution, usually 10 percent sulfuric acid and water. This solution cleaned the metal of any grease or contaminants that may have prevented the enamel from fusing to the metal. Another difference between normal enameling practices and my experience is the dimensionality of my sculptures. The peaks and valleys were challenging to enamel because during the firing process, the enamel is liquid and moves and pools on three-dimensional shapes. To get the enamel to stick to the curved surfaces, I used a base layer of liquid flux and sifted White 1010 enamel. This layer created an easier surface to which the other enamel could fuse. To produce the colors, I used a spray of Klyr-Fire and water and sifted the dry, translucent colored enamels onto the surface. Once the Klyr-Fire dried, I fired the sculpture in a kiln at 1500 degrees Fahrenheit until the enamel had just melted and fused together. Each sculpture took up to eight firings to obtain the correct colors and translucencies. To finish the artworks, I used a technique called stoning. Stoning is the abrasion of the surface of an enamel piece to even out the surface using either a carborundum stone or an Alundum stone. For my sculptures, I used stoning to clean off the enamel from their edges and peaks so that the copper would shine through and contrast with the bright enamel colors
Patinas are another way of coloring metals that I used for one of my copper sculptures, *Climbing*. A patina is the film and discoloration created on a metal by the application of chemical compounds to its surface. This effect happens naturally with the oxidation of metals such as copper and bronze, but can be controlled and created with specific chemicals. For the collar piece in *Climbing*, I used the commercial patina Midas Green Patina Solution purchased from Rio Grande to produce a green-blue dappled pattern on its surface. The result was organic and dark in color and complemented the colors of the other artworks in its cycle.
CHAPTER THREE
DESCRIPTION OF ARTWORKS AND TECHNICAL PROCESSES

This exhibit combined multiple media, colors, and processes to express my multi-disciplinary approach to art and artistic expression. My thesis was three cycles, three parts each, each part using a seemingly different medium that combined to create visually cohesive artworks. The cycle began with a paper sculpture, taking a two-dimensional material, challenging its usual form, and creating a textured, three-dimensional artwork. The second step was developing an enameled copper artwork based on the idea or shape of the original paper sculpture. This part allowed the paper’s three-dimensionality to be tested in a different medium and permitted me to explore and learn the process of electroforming. The third and final step of the cycle brought the design back to a two-dimensional representation by way of digitally flattening the copper artwork into a graphic image. I then used my graphic design and digital art skills to create a graphic illustration or pattern using the flattened image. After printing, the image was framed and displayed as the final part of the cycle.

Paper has always been an interest of mine because of how it is used and thrown away so quickly without thought. Each US resident uses and wastes around 700 pounds of paper a year. Paper has been degraded to serving as useless advertisements that barely get a glance, but it can also be found in the form of books, newspapers, and magazines that all contain
information, memories, and feelings. I have been fascinated with creating art from wasted paper; something that will draw one’s attention to a material that was merely trash and to how that trash can become alive and beautiful. Through my artwork, viewers will begin to comprehend the amount of “extra” paper that is pointlessly discarded every day.

Form and color are the other concepts that drive this thesis. My background in architecture was very structured and had many limitations, especially dealing with mechanical and electrical systems, plumbing, and the actual structure of the building. My formal choices were limited by these restrictions. My master’s work has allowed me to branch out into abstract design, free-flowing curves and planes, and organic compositions. These new ways of expression feel more natural, artistic, and intuitive. Using paper and metal, I can work wonders with these types of expressions, creating unique shapes and allowing the process to stand out. Color also plays a crucial role in the completion of my artwork. I enjoy working with a varied palette, allowing me to entice different emotions or responses from the viewers. Color adds much information to design and also helps to attract and hold the viewer’s attention.
Fashion

Figure One

Figure Two

Figure Three
Fashion

Every day girls are bombarded with images of stick thin models wearing trendy clothing. All of these advertisements and catalogs focus on negatives: your body doesn’t look like this (but it could!), your clothing is old (get some new clothes!), your clothes aren’t the latest trend (but this is!). People easily buy into the fabrications of “normal” body size and what their wardrobe should be. Fashion is the first cycle I created, and it focuses on body image, self esteem, and the catalogs we receive in the mail full of clothing that one “has to own.” The artwork for the cycle consisted of a paper sculpture skirt (figure 1), an enameled copper flower necklace (figure 2), and a multi-color flower graphic design print (figure 3).

The paper sculpture began with a base model made with thick wire as a top and bottom hoop and butcher paper for a basic structure. I then created panels of texture by wrinkling the paper to create ridges and gluing them in place. These panels were attached to the structure and the other panels to create the completed base model. I added color by cutting up clothing catalogs and advertisements, sorting them into their different color groupings, and using Mod Podge to glue them in place. It took nearly one hundred magazines to cover all three paper sculptures. I used a rainbow of colors for Fashion to represent all of the clothing that catalogs are selling. A flesh colored section shows the surprising amount of skin that models show in order to sell clothing. There is also a section full of eyes staring at the viewers. These eyes represent peer pressure and the news media that stare down girls and make them feel self-conscious and inferior. To finish this piece, I sprayed a thick layer of clear glaze to add a shiny coat, hand sewed a satin sash around the top, and created a tulle tutu to fill the bottom of the skirt. These finishing touches polished the skirt and made it truly wearable.
The metal sculpture for *Fashion* was designed as an accessory to the skirt: a bright flower necklace. The colors and femininity of the necklace came from the paper sculpture. The flower in the necklace began as a paper flower, using the same butcher paper and glueing technique. I then used spray paint to seal the paper from exposure to the acid and chemicals in the electroforming bath. I attached lead wires to the now covered paper piece and painted one side of it with electroconductive paint, Safer Solutions. The piece was then ready for electroforming. After one to two days electroforming, I was able to take out the now copper flower and burn off the spray painted paper, leaving me with a fully copper shape. It took much cleaning to remove the paper and electroforming residue. Once clean, I was able to begin enameling. The base coat of enamel was liquid flux and sifted White 1010 enamel. During this time I test fired multiple pieces with different overlapping transparent enamels in order to find the best rainbow effect. I used a light spray of Klyr-Fire and sifted overlapping layers of red, yellow, and blue enamels to obtain the rainbow effect on the flower’s white surface. After firing, I stoned, sanded, and polished the edge of the flower to obtain a high shine finish. Pat Nelson assisted me in creating the prong holding and forged necklace component, and I patinated it all with Liver of Sulfur to finish the piece.

The final part of the cycle was the graphic design print. I began with a photograph of the metal flower, not including the necklace setting. In Adobe’s vector program, Illustrator, I outlined the shape and major lines to create a digital version of the copper piece. I then chose colors based on the enameled flower and the skirt. The layout of the final pattern was based on inspirations from Marimekko with bold colors and interesting shapes. The background shapes create more interesting white space around the flowers, and overall the design is vibrant, colorful, and fashionable.
Cascade

Figure Four

Figure Five

Figure Six
Cascade

Direct mail advertisements and ads in magazines, newspapers, and on television flood everyday people with false information and propaganda. They say, “This product will improve your quality of life, make it easier to live, make you popular with house guests.” People are drowning in all the information that is peddled to them each day. The second cycle I created ponders on these stimuli and shows the Cascade of advertisements. The three parts of this cycle were a paper waterfall (figure 4), an enameled copper wall-mounted sculpture (figure 5), and a monochromatic graphic design print (figure 6).

The paper sculpture for Cascade started with one long piece of brown butcher paper, nearly 15 feet long. I worked with the paper the same way as previously and created flowing peaks and depressed valleys to make a waterfall. Fluid, curved ends created a feeling of movement. The color came from magazine advertisements and direct mail ads. I sorted each color group and organized them to obtain the best flow of colors across the entire sculpture. The colors fluctuate from light to dark, turquoises to cobalt blues. There is also an eye section with the piercing eyes from advertisements, trying to convince the public that the product is necessary for a happy existence. To finish this sculpture, I used multiple coats of glaze for a shiny surface and more liquid appearance, and I used thick wire to create a mounting apparatus. While working on this design, I felt the sculpture was large and would feel powerful in the exhibit. Once on display, however, I realized that it needed to be two to three times larger in order to get the feeling of flooding and the influx of pressure to buy products.

The metal sculpture was designed to reflect the paper sculpture’s form and flowing movement. This metal piece was quite difficult because its swirly appendages consistently
broke off in the electroforming bath as they gained weight from the copper deposits. It took two tries to create the final version, and it still required additional rivets and wire sewing to hold the final piece together. This metal *Cascade* began as paper with the same flowing lines as the previous artworks. I cut the model into two pieces so it would fit into the enameling kilns when it was finished electroforming. I spray painted both pieces to seal the paper from the electroforming bath. After drying, I attached lead wires and painted one side with the electroconductive paint. The two parts electroformed at the same time for a period of two days to build up enough copper. I burned off the paper and cleaned the copper thoroughly before beginning to enamel. I test fired a variety of transparent blue enamels before finding four that complemented each other and that best reflected the colors of the large paper sculpture. I enamelled each half separately, beginning with a base coat of white and adding layers of blues until it was the correct vibrancy. During enameling, the heat warped the pieces and caused some structural damage that I later repaired with rivets and epoxy. To finish the metal sculpture I stoned, sanded, and polished the edges to create the contrast between blue and copper. I mounted the pieces with curved copper wire on a piece of wood. The black finish of the wood makes the blue enamel stand out and allows the copper wires to blend into the background.

The graphic illustration was the final part of the cycle. I began with a photograph of the metal sculpture before it was mounted and drew the form in Adobe Illustrator. The colors are based on the final enameling which created a shape almost like a water creature. The final pattern came from arranging the shapes in different ways until it was well-balanced and had flowing lines. The overall feeling from the arrangement is soothing and serene as if these creatures are just floating around in the cascade of advertisements.
Climbing

Figure Seven

Figure Eight

Figure Nine
Climbing

If the advertisements in general weren’t damaging enough, the way that ads manipulate the mind is downright destructive. Over time the ads’ misinformation starts to grow and take over one’s mind like an infestation of weeds. The need for possessions grows greed and creates envy of others with more belongings. Greed creeps up slowly in order to fully entangle its prey before completely consuming it in the pointless collection of products. For my final cycle, I created Climbing to show the growth of greed and envy fabricated by advertisements. The three pieces of artwork in the cycle were a ground-based, growing paper sculpture, a patinated metal collar necklace, and a monochromatic graphic design print.

The paper sculpture for Climbing took a different direction than the previous two by being situated on the ground. I designed it to sit in a corner, unassuming until it fills a room with its growth of greed. I began the sculpture by creating organic, flowing peaks and valleys on multiple pieces of butcher paper. I combined them to produce the final form and added thick wire in places to help support the natural structure of the paper. The stability of the shape was the most difficult part of this paper sculpture. Once I added the coat of colored paper and glaze, the extra weight created different stress folds and compromised the structure. I added extra wire supports multiple times throughout this process before I was satisfied. The surface color came from magazine advertisements for products. The shades of green directly relate to both greed and envy. To finish the sculpture, I sprayed it with a few layers of glaze to have a more polished surface.

The metal sculpture was based on the growing aspect of this theme, and as a necklace it seems to extend its grasp ever so slowly around the wearer until it is in complete control. I started with a wire base and built the butcher paper up around it to form a collar.
necklace. I added copper wires as “off shoots” to add some movement and accentuate the collar’s growth. I sealed just the paper with spray paint to prevent deterioration in the electroforming bath. I then added lead wires and painted the back side of the collar with electroconductive paint, including paint on the base of the spiral wires to ensure their connection with the collar. The collar took longer to electroform because the valleys in the paper did not build up copper very quickly. After 2-3 days of electroforming, burning off the paper, and electroforming again, the collar had enough structure built up to support itself. Due to its size and thin sections of metal, I decided against enameling the collar and used a patina for coloring. I applied a coat of patina, allowed it to develop and dry, wiped off any chalky reside, and repeated the process until I obtained the shades of green-blue that I was working to create. I used steel wool to clean and shine up the edge of the collar and the peaks on its outside.

The graphic design print emphasized growth and greed’s complete consumption of the mind. The process was the same as the previous graphic designs; it began with a photo of the metal collar that I redrew in Adobe Illustrator. The greens I chose were deeper and darker than the collar, but brought more attention to the weed-like appearance. The layout for the pattern was different than the previous two with its overlapping shapes that felt almost like a jungle with vines reaching out to grasp the paper. This design plays more with negative space, especially around the swirls, forming a good composition.
CHAPTER FOUR

CONCLUSION

This creative project has been a completely new experience and a significant opportunity. Coming from a background in architecture, I have much design experience and a history in three-dimensional art. This project allowed me to delve into a new area of study: metalsmithing and specifically electroforming and enameling. At first I was frustrated with my lack of experience, but I soon discovered that I had a unique perspective in this field. I had no preconceived notions about what was right and wrong, so I traveled in a different direction and found new ways to use old techniques and equipment. I also had a completely different skill set than other metals students that included computer drawing and drafting, model making, and proficiency in laser cutting (a computer-operated machine that uses a laser beam to cut through materials). With the combination of new ideas and a distinctive skill set, I learned more about metalsmithing as it is taught today and what metalsmithing could evolve to in the future.

The first thing I realized when planning this creative project was that I had to refine and reduce my scope in order to create a functional project. I wanted to incorporate each new aspect of metalsmithing into my final project, but decided to concentrate on mastering two main techniques instead: electroforming and enameling. Electroforming is a wonderful
tool, helping the artist change something ordinary, such as paper, into a copper masterpiece. I saw so much potential in its abilities and what I could create with its help. Enameling instantly drew my attention due to its capacity to add vibrant colors and beautiful finishes to metal constructions. I felt that these techniques fit well together and could produce stunning results.

As I began researching these areas, I realized that the best way to learn about new ideas and techniques was to investigate and test a multitude of variations. I did this with each part of my cycle: the paper sculpture, electroforming, enameling, and graphic design. I tried many different ways of manipulating paper into patterns by folding, crumpling, and creasing and different ways to hold the paper’s shape with a variety of glues and clamps. I electroformed many small sample pieces to find the correct sealing agent (spray paint), electroconductive paint (Safer Solutions), electrolyte bath consistency, and electroforming time. I created sample enamel pieces with different overlapping translucent colors and tested how long the pieces needed to be fired in the kiln. I designed several compositions for each graphic design element and test printed each design multiple times to check color consistency. These processes allowed me to gain copious experience in each area and improved my creative project through the constant evolution of techniques and ideas.

By combining my unique skill set and what I learned through testing variations, I discovered new ways to use the electroformer. I was able to use my digital drawing abilities, laser cutting expertise, and electroforming knowledge to form a new outlet for my design potential. I began in my computer software by drawing medallions with the outlines of words all through the inside. The words were all graphic design related and resonated with who I am as a designer. I used a laser cutter to cut the designs out of mat board, a thicker
board that could stand up to an extended time in the electrolyte bath. Using what I learned from my electroforming trials, I covered the mat board in spray paint and used the Safer Solutions electroconductive paint on one side. I tested many variations of the medallions in their sizing, how thick to electroform them, and how to patina, enamel, or color them. The end result of all of my experimentation, trials, and tribulations through this creative project was a beautifully simple yet elegant copper medallion with commercial potential (as seen in Appendix A). This creative project as a whole has given me the abilities, ideas, and ambition to excel not only in metalsmithing, but also in art and in life in general. The lessons I have learned translate into all areas of study and will help me to be successful in my future endeavors as an artist and a professional designer.
CHAPTER FIVE

EXHIBIT STATEMENT

How do we view paper? Most people would say disposable or trash. Many people do not even realize how much paper they use and waste every year, a staggering 700 pounds each.

How do we view the dimensionality of paper? Most commonly it is only seen as a flat, two-dimensional sheet. For me, change in dimension is interesting, especially when working something inherently two-dimensional into a three-dimensional sculpture or object.

For my creative project, I created a cycle by making sculptures out of flat paper, allowed the paper forms to inform enameled, copper sculptures and wearable jewelry, and then translated those colorful, metal pieces into two-dimensional graphic designs printed on paper. After years of working in architecture, my artwork has broken free from past rigid structures and become fluid, moving, and organic. I enjoyed further exploring these natural forms in paper and pushing them into the medium of copper, which I have been studying during my graduate career. I focused on advancing my knowledge of the electroformer and enameling to make colorful, copper artworks directly from paper sculptures, building up copper on the paper surface itself. Based on these copper sculptures, I created graphic images in patterns that enhance the previous artworks, thus bringing the cycle to a close. I’m
very thankful to have found a way to include many forms of art that I enjoy: sculptural, paper, electroformed, enameled, and graphic design. Additional artworks are displayed to show the extent of my experiments in electroforming and enameling. Through the finished cycles, viewers will be forced to look at advertisements that are thrown at them every day, and, in this different format, they will begin to comprehend the wasted paper, its influence over other media, and its potential to be something beautiful.
BIBLIOGRAPHY


The following pages show preliminary sketches, in progress photographs, and detail photographs of all three cycles.
Preliminary sketches for *Fashion* including the original design for the copper piece that was later changed to a copper flower necklace.
Preliminary sketches for *Cascade* including the paper sculpture and metal sculpture designs.
Preliminary sketches for *Climbing* including the paper sculpture and metal sculpture designs.
Close-up of paper sculptures for (clockwise from top left) Fashion, Cascade, and Climbing.
Metal sculptures after electroforming: (clockwise from top left) Fashion, Cascade, and Climbing.
Some of the many electroforming and enameling experimentations. Counter clockwise from above: electroformed copper foil ring, electroformed laser-cut medallions, enameled medallions, overlapping translucent enamels on electroformed copper foil cuff bracelets.