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Nucharin Wangphongsawasd

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r.m.p. Repetitive Multiple Progression

By Nucharin Wangphongsawasd
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Thesis Committee Final Approvals

Chief Advisor: Richard Tannen

Associate Advisor: Andy Buck

Associate Advisor: Elizabeth Kronfield

Chairperson: Robin Cass
Part I  Abstract

In our daily life, we encounter repetitive patterns in many places, from the natural world to manmade objects. Interesting echoes emerge, such as the relationship between the spiral chambers in seashells and spiral staircases. Seashell chambers grow in spirals starting from the center, with each chamber increasing in size over time. Past craftspeople observed this pattern and applied the form to vertical staircases. The repeated step in vertical alignment forming a spiral pattern is a very effective method of construction for limited space, particularly in tall, narrow buildings such as lighthouses.

Repetitive patterns create an infinite feeling of progressive movement. When viewing a pattern from different perspectives, the evidence of how form grows can be observed. I also like to break down forms into their basic elements to better understand how they are created and how many differing elements are involved. My work inspires function leading to interaction between user and object. My forms are an exploration of linear, curvilinear, planar or volumetric configurations. I also study transitional patterns that shift from small to large or from short to long.

In this vein of work, I created a coffee table, which experimented with rectangular frames repeated in horizontal alignment along a bending lamination curve. The result was a coffee table that found a good balance between the progressions of form while still serving its function. In the process, I found a way to explore better function and design to incorporate in the next piece. My goal is to create a body of work influenced by repetition
from both natural phenomena and manmade objects, focusing on experimentation with different types of repetitive patterns and progressions. These pieces of furniture will represent a variety of dynamic forms with functional applications.
Part II  Discussion of Sources and Research

1. Source of Inspirations– Form Experimentation

We experience repetitive patterns in everyday life from things that nature creates, like spiral seashells, to manmade objects, such as a spiral staircase. They exist in various scales from small to large. Repetitive pattern is a simple and straightforward method of creating a form, yet sophisticated and fascinating at the same time. They incite curiosity about how a form is created, where it starts and ends, and what would happen if each element were broken apart and reoriented in a different way.

Fig.1 Spiral chamber in seashell

Fig.2 Spiral staircase
Simple objects that I saw daily became inspirations that always appeared in my mind when I began to design an object. This approach and gradually become the main creative theme in my body of work. Before coming to a graduate school I had been trained as an Industrial Designer for almost 8 years, and a quote from the first day in my Industrial Design School made a big impression on me. “Form Follows Function, create a good object” is what I have been taught all along. I still believe in this quote, yet coming to a graduate school in Furniture Design has taught me to break out from my comfort zone. I started to question, “What if I use form to inspire function? What if I create the forms, then give them an application?” With this curiosity and these questions I was encouraged to experiment, which became an important part of my process. I started by playing with material and exploring form to understand more about structure and develop a better visual progression.

At the beginning of my process, I started working with source material that I developed into a design. I would begin with a simple straightforward technique like tracing the outline of an object, and with this as a starting place I would multiply the object, repeating at different angles. After the preliminary drawing, I would make the idea more tangible by experimenting with real material to build a small model. Through this method I could see the form and its progression in three dimensions and begin to understand more about wood and the method of creating.
I worked with different processes to create a repetitive pattern and progression. First, I experimented with material by cutting solid blocks of wood into different sizes, stacking them together, and orienting each piece in varying angles to create a simple progression. The problem I found in this experiment is that the form was visually heavy and most of its elements were either square or rectangular. After the first experiment I realized the limitations of this technique in terms of form and progression. With the knowledge gained from my previous experiments, I began trying to investigate different working methods to generate more variety of repetitive pattern and progression and to soften the look of the form. I moved from using solid blocks of wood to thin strips of wood, aiming to create a better flow in the progression.
Fig. 4 Preliminary drawing
Fig. 5 Form exploration mock up

Fig. 6 Form exploration with bandsaw technique
For the second experiment, I used strips of wood to create progression in length from short to long, stacking them together at one end and spreading them out to create a fan shape. However, the result didn’t provide much variation, and nothing stood out enough for further development. I then experimented with a more simple technique by cutting solid pieces of wood with a bandsaw partway through, following the grain, then against the grain at a diagonal. I experimented with the results by twisting the form, spreading them out and using a wedge to create tension and to make the form expand. This method of using a wedge interested me the most. With this simple technique, not only was the progression created naturally, but also it led to a new development that went beyond my last experiment. I combined strips of wood and the wedge technique together
by gluing the ends of the strips to make them solid and putting a wedge in between each strip. Once I closed the other end of the strips, I discovered that they started to create a new form. I was drawn to these last two experiments the most since they provided more freedom in the creation of form, more room for variation, and a progression that happened naturally and provided a light and airy feel.

Fig.8 Form exploration with wooden strip and spacer
Informed by all the experimentation, I chose a couple of forms that I was drawn to and began developing designs for furniture based on them. The development from an experiment with form to functional design was quite challenging, and I found it difficult to provide a good balance of form that represented repetitive pattern and progression and still served the function furniture demands. This became the criteria I used to decide which forms I could develop into a functional piece, because some of the forms couldn't evolve beyond their pure shapes into useful objects. My process also involved a lot of refinement of both design development and building technique to ensure that I could achieve a better result in the work.
Part III  Critical Analysis

Coffee Table - XYLO

Fig.9 Coffee table – XYLO
White oak, 17H X 24W X 45L
I started this piece with the simple and straightforward idea of creating a progression by changing the width and length of each component as the form progressed. I also wanted to find a good balance between using a repetitive pattern to create progression, and providing a function as a utilitarian object. This table was constructed from rectangular components shifting in length and width from large to small. The rectangular components followed bent lamination pieces to create movement and progression. The top was attached to a bent lamination base, which followed the same curve in its overall form, subverting my intention of making the top stand out as much as possible and harmonizing the base in relation to the overall form so that it didn't look too much like an afterthought. I used white oak because of its straight grain and consistent color, which provide a warm, friendly feeling for furniture to be used in a living space. The straight grain helped simplify the form and made it more settled.

I used a miter technique for constructing the frame, enabling the form to have good continuity. I decided to show the exposed spline joinery with the intention of creating more overall progression in the pieces. I also used silicon bronze screws as an exposed fastener to connect the rectangular frame with the bent lamination pieces. In the final result, both of them together started to draw attention away from the top.
Fig.10 Coffee table – XYLO top view
There were still a few issues to resolve with this piece. Most importantly was how I would construct it to make it more durable and the overall form more complete in itself. The leg part seemed like an afterthought and an add-on element. I needed to find a better way to give the whole form a stronger sense of continuity so the progression of the elements could be developed more strongly in each frame by alternating the thickness of each part and by tapering the bent lamination components from thicker to thinner.
Coffee Table - THEO

Fig.12 Coffee table – THEO
Ash and Walnut, 15H X 53W X 54L
My aim for this piece was to push the aspect of function further than I had in my previous piece. I also wanted to experiment with different shapes beyond the square or rectangular to create a better flow of progression. This table was inspired by the shape of seashell spirals and the way they progress in form, growing from small chambers and getting bigger over time.

Fig.13 Model of *THEO* first design
At first, I started with a more complicated design involving expandable mechanics that allowed the design footprint to end up larger than the working surface. It still didn’t provide enough in terms of function, so I took one step back and asked the question "What makes a table a table?" and "What is the main function of it?" After consideration, I simplified my design and came up with a spiral table that can be separated into three different tables. The idea of separate sections made it easy to move around and also gave the user the opportunity to choose the section that was most suitable to their specific need, or to combine them into one complete table.

Fig.14 THEO separates section
Fig. 15 *THEO* arrange in different orientation
The table was made from Ash, a light-colored wood, to provide a light and airy feeling. I used simple and compound miters with walnut spline details aiming to create more tone for progression. I wanted the base of the table to provide an open space, making it look less solid and heavy. The first idea I had for the top was to use a darker wood, but it ended up creating a heavy feeling and didn't go well with the rest of the pieces, so I decided to make the top from Ash to keep the light, soft tone.

This piece answers the functional aspect quite well, however the progression of the form did not stand out enough. Learning from this concern, I was committed to develop this progression better in the next piece.
Fig.16 Hallway table – *IKE*
Ash, Ash strips, 32H X 16W X 50L
Fig. 17 *IKE* front view
The experiment with the wood strips and wedge is the main inspiration for this table. After the experiment, I had developed the technique and progressed from employing the wedge as a mere spacer to using it to create a contrast between solid material and open space and from thicker to thinner components. The first idea for this piece was to make it from Ash strips, with a spacer in between each strip progressing in length from short to long. I glued each strip to each spacer, and glued them into a single piece. Then I glued the ends of the strips together. As a result I created a fan-shaped form. However, this first idea raised the issue that when I tried to develop the pattern concept into a table, the form lost its continuity because the end of the form seemed cut off.

Fig.18 First form exploration of IKE
To regain the continuity of form, I decided to remake the part in exactly the same manner in order to create two identical tables, which are a mirror image of each other. I also decided to change the shape of the spacers to create a better progression. I didn't have good control over the making process, therefore the spacers from the two parts didn’t line up very well. So, I decided to make it again in one whole form.
Changing the form gave me an opportunity to make the table taller, a departure from the previous pieces, which were both low coffee tables. Theorizing that height can make the top look more light and airy, I decided to make it a hallway table. I chose a simple structure for the legs to make sure they wouldn't draw attention away from the top. I used a miter technique to connect the legs with the top and to blend them as one structure. The left and right leg, which connect with a miter, start as the same width and thickness of the top and get thinner, tapering down in a slight angle.
Both of the legs in the middle are connected to the top by mortise and tenon technique, and also start with the same thickness of the top and taper down in a slight angle. The slight angle helps make the whole form look sleek, yet still provides enough of a footprint for stability. The cross member at the base is connected by a simple half lap, and all the legs connect with the base by a bridal joint.
Fig.22 Side table – *STELLA*
Ash, Ash strip, Walnut, 27H X 11W X 44L
This piece is also a development from my experiment with wood strips and wedges. This experiment provided me much freedom and flexibility to work with wood. I first started by using thin Ash strips and putting square shaped wedges in between each strip. Then, I glued up the ends of the strips to make the form stay. The wedges not only created a tension and spread the form out, but they also created a progression. The wedges were made from walnut to create a color contrast between the parts. The legs were also made from strips to maintain a light and airy feel, but the result didn’t turn out that well. I ran into issues concerning strength and stability. The angle of the legs spread them out too much, which could cause people to trip over them. The thickness of the strips were also very thin, which made the piece very fragile and less practical to serve its function.

Fig.23 Dry fit model leg

Fig.24 First model for STELLA
I decide to redo this piece and come up with a solution to solve those issues. I increased the thickness of the strips also made them longer. I changed the shape of the wedges from squares to diamonds. The change in thickness provided better strength, and the diamond shape created a better tension for the strips. At the beginning, I experimented with odd and even numbers of wedges, aiming to create an asymmetrical form. Once the thickness of the strips was increased, the mix between odd and even numbers from both sizes didn't seem to work very well.
The flow of the curve seemed awkward, and also the sizes that had more wedges were not only harder to control, but also created a tension that caused the whole form to twist. I did a couple more experiments until I discovered the right solution. As a result, I decided to keep the form symmetrical and use 6 wedges for each side. The legs were made from solid Ash and spread out at a slight angle. Both the top and the legs maintained the same thickness, and I also tapered the legs to create a lightness and airiness in the overall structure.
Part VI Conclusion

The Body of Work

Fig. 27 Scene of the MFA thesis exhibition, at Dyers Art Center, 2013
When I first started my form experiments, the function of the work was undetermined. Most of the form experiments I created and had been drawn to were in a planar orientation, which had very good potential to be a table. Once I started to develop my building technique and increase the scale of my mock ups, my work started to follow that direction even more. My body of work consists of 2 coffee tables, a side table, and a hallway table. Tables have a straightforward function, which provided me with a good balance in expressing my interest in repetitive pattern and progression in form, while still maintaining their original function as a table.
Each of the tables I created represents the repetitive pattern and progression in different ways. Their techniques were influenced by the development of my form experiments, which started from solid blocks and progressed toward the lightness and airiness of the wooden strips. In particular, the technique of using strips of wood that I used on my side table and hallway table is what I had been looking for throughout the process. In my last two pieces, I tried to deliver the same freshness and visual aesthetic that I had originally encountered in my form experimentation. I found a proper balance between building
techniques and aesthetics that I want the audience to recognize in my work: the utilization of a simple and straightforward technique to create a sophisticated outcome.

I consider my body of work to be the first generation of a design language I would like to continue after I graduate. I have not only found the style and building technique that interest me, but also started to find a connection between my work and myself. The journey of creating a body of work not only taught me to take risks and step out of my comfort zone, but it also taught me to listen to my curiosity, to approach the questions from various angles, and to experiment until I reach a satisfactory solution. I’ve learned to question and try different approaches before I start to design the end object, and to let these lead me to a multitude of forms with various opportunities to become a piece. This passion and these questions will be a main drive to push me to experiment more, experiment better, to create more and create better.

I consider the journey of creating this body of work to be a starting point, not a finish line. Along the process I’ve learned a very important thing: that when I start without planning what the finish line could be, I discover an unexpected journey which leads me to various opportunities in creating the work. While my work has grown in the process, I also found that I have grown as a designer and a maker. I began by learning the skills to build, and with these new skills, I created my own method and aesthetic language that I want the audience to recognize in me and my work. This body of work is the beginning of new journey that will lead me to new methods of creating the work and transform me from being a student to becoming a professional designer and maker in the real world.
Implications For The Future

There are also a couple of issues I would like to work on more when creating my next generation of this series. I would like to start by revisiting my last two pieces to refine a couple of issues that appeared after I finished them. For example, I would reconsider my choice of joinery and endeavor to provide more stability for the structure. I would also provide a better refinement of building technique and create a connection for each detail. I would like to take my form experiments to another level by developing and combining other building techniques, such as a coopering technique with a spacer and wedge to create different shapes such as a bowl. I will also provide more variation in the width, length, shape and thickness of wood strips so that the idea of progression can be seen in every aspect of the piece. With the development of my process, I believe I can expand the idea of progression to be more three dimensional, which will give me more opportunity to create different types of furniture beyond just the table.

I’m also interested in combining other techniques to create repetitive patterns, for example weaving, which is a well-known technique that has been in use in my country for a long time. Weaving does not require a lot of tools and machinery. Weaving is a simple yet sophisticated technique, which can create numerous different forms. I would like to reflect more about my cultural background in my work in order to gradually introduce the audience to my cultural background. I’m also interested in the use of different materials like metal, clay and fabric for providing a broader potential for what
and where the piece could be. The variation of scale is also important; it provides more opportunity for the piece to become different kinds of objects from large scale, like a sculpture piece, to small scale, such as jewelry. With this plan I can ensure that I’m really providing myself the opportunity to experiment with repetitive patterns, and not stuck on the same method and same type of object. Moreover, as a designer and maker I also want to push myself to create work with a freshness for becoming the next generation, not a mere reproduction of my previous piece.
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