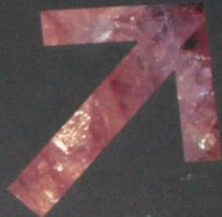


Convergence





## The Story So Far

I explored the theme of boundaries during my AS work. My final piece reflected on how the defense of boundaries is commemorated through war memorials. As I explored war memorials, I examined the forms they took and the impact this has on the final art work. It was through this exploration of form that I then reflected on my final piece in a different way. My sculpture became a convergence of forms, reminiscent of the forms found within nature.....

Through my journey, my sculpture took on different forms, but reflecting back it was, and now is, the convergence of the natural vs man-made forms that interests me.....



Below you can see the physical transformation of my final AS piece, and how the convergence of the blocks impacts the presence of the piece

## What Convergence Means To Me...

Biological convergence, the convergence between nature, biological processes and art is a topic that excites in fact for me and has built up over time - whether through the explorations of Karl Blossfeldt who taught his art students drawing skills through photographs of strange natural forms and getting them to re-draw in charcoal sketches to the beauty of organic sculpture there are many aspects of this convergence that engage me.



Chemical convergence is the process of organic transformation from the original alchemists to nature's own alchemy - such as 'rusting' chemical changes in form and function can define pieces of art.

Mathematical convergence - or the mathematical occurrences in nature have a certain beauty and mystery within them. From the 'golden ratio' to the Fibonacci sequence to Vogel's model the convergence of mathematical principles in art is intriguing.



Futura vector



**Mind**

**change** *Karl Blossfeldt 1865-1932*  
 natural forms combining with man-made settings

**Biological**  
 The convergence of science and nature of biology and art  
 Biological growth & development of infusing forms  
 growth

**death**  
 (comparing man made + biological in sculpture in JAPAN! botanical sculpture, Kuribayashi Hotel, Chugyojika, Curvent)

**transformation**  
 scientific equipment used to support nature (Robert Stead)

**Anticipated**  
 The mathematical relationship with nature revolves around the Fibonacci sequence and the derived "Golden Ratio"



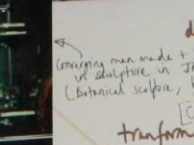

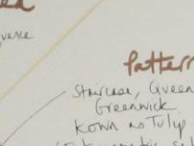
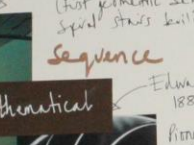



**Repeating**  
 A yellow chamomile head showing the arrangement in 21 (blue) and 13 (grey) spirals

**Pattern**  
 Stairs, Queen's House Greenwich  
 Kowon as Tulip stairs, 1635  
 (First geometric self-supporting spiral stairs built in Britain)

**Sequence**  
 Edward Weston 1886-1958  
 Pioneering black & white photographer of geometric (mathematical) patterns in nature

**Mathematical**  
 Fibonacci sequence visualized

*changing perspectives*

**Chemical periodicity**  
 The formation of gemstones is a chemical library  
 pressure  
 natural vs. man-made influence derived through natural forms

**Chemical**  
 atoms  
 The convergence of chemical reactions and the resulting natural forms  
 examination of the chemical process of decay

**'Time'**  
**Map**






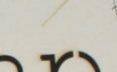
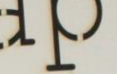

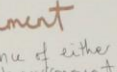
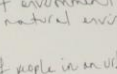








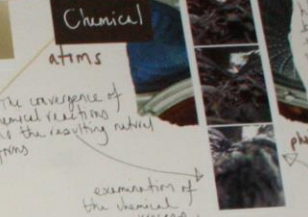
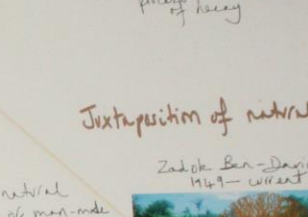




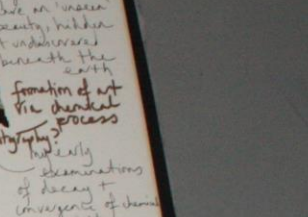
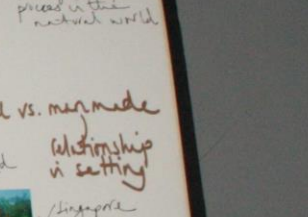
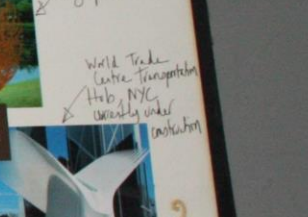


**Physical**  
 The form of the building follows the convergence of bio-morphic shells

**Juxtaposition of natural vs. man-made**  
 relationship in setting!  
 Wild Trade Centre Transportation Hub, NYC  
 (usually called 'radiation')

**Movement**  
 The convergence of either natural forms in a built environment or man-made forms in a natural environment  
 The convergence of people in an urban space

*photography? literally examinations of decay + convergence of chemical spread in the natural world*

*Singapore*



# The Mathematical Natural Convergence

The link between maths and Nature is often defined by the Golden Ratio. In mathematics, two quantities are in the golden ratio if their ratio is the same as the ratio of their sum to the larger of the two quantities. The figure on the right illustrates the geometric relationship. Expressed algebraically, for quantities  $a$  and  $b$  with  $a > b > 0$ ,

Some twentieth-century artists and architects, including Le Corbusier and Gaudi, have proportioned their works to approximate the golden ratio—especially in the form of the golden rectangle, in which the ratio of the longer side to the shorter is the golden ratio—believing this proportion to be aesthetically pleasing. The golden ratio appears in some patterns in nature, including the spiral arrangement of leaves and other plant parts.

Mathematicians since Euclid have studied the properties of the golden ratio, including its appearance in the dimensions of a regular pentagon and in a golden rectangle, which may be cut into a square and a smaller rectangle with the same aspect ratio, seen below.



## The Fibonacci sequence: Spirals in nature



↑ Here are 2 examples of the Fibonacci sequence and how it converges with nature

0, 1, 1, 2, 3, 5, 8, 13, 21, 34...

← Here is a combination of edited photography using different coloured filters on photoshop, overlaid with the Fibonacci sequence and scrolling spiral

Edward Weston



Edward Henry Weston (March 24, 1896 – January 1, 1958) an American photographer, known for his black and white photography of natural subject matter, particularly those that demonstrated repeating mathematical forms. Weston was born in Chicago and moved to California when he was 21. He knew he wanted to be a photographer from an early age, and initially his work was typical of the soft focus pictorialism that was popular at the time. Within a few years, however, he abandoned that style and went on to be one of the foremost champions of highly detailed photographic images.



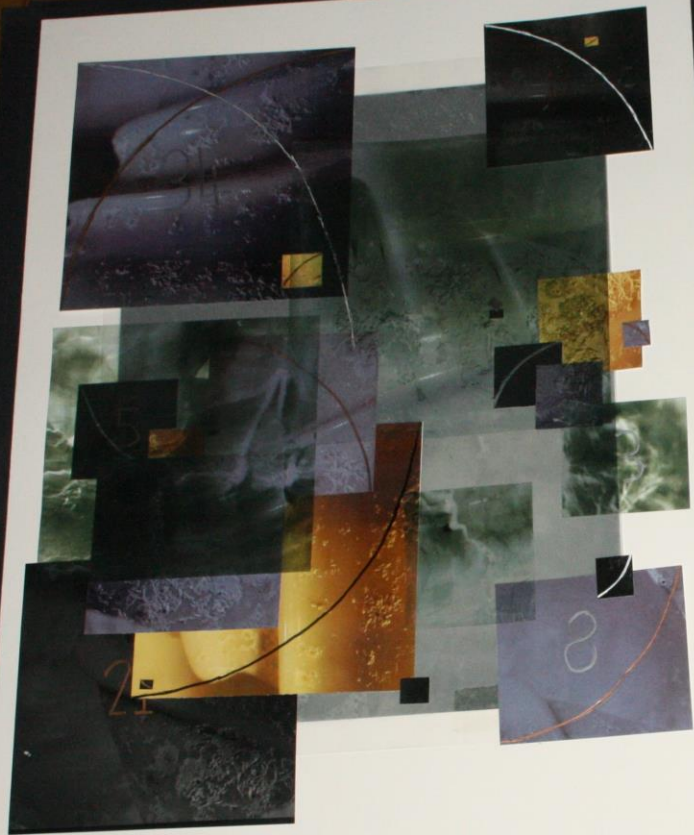
I experimented with surface macro photography (above) investigating the four detail of shells (below)



Investigating the 'golden ratio' in smaller organic shell structures







↑ A Fibonacci inspired collage, based on my original photographs of shells that followed the Fibonacci sequence



These photographs are taken using a macro lens extension, delivering close ups of mathematics in nature



# DAMIEN HIRST



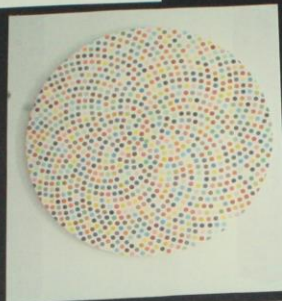
Damien Steven Hirst (born 7 June 1945) is an English artist, entrepreneur, and art collector. He is the most prominent member of the group known as the Young British Artists (or YBAs), who dominated the art scene in the UK during the 1990s. He is internationally renowned, and is reportedly the United Kingdom's richest living artist, with his wealth valued at £215m. During the 1990s his career was closely linked with the collector Charles Saatchi, but increasing feuds came to a head in 2003 and the relationship ended.

Below you can see Damien Hirst's dot painting based off Fermat's spiral. To the right → my own interpretation of this made with laser cut acrylic sheets and colored silk thread.

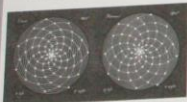
**Fermat's spiral** (also known as Archimedean spiral) follows the equation  $r = a + b\theta$ . It is a type of Archimedean spiral; in size phyllotaxis, as in the sunflower and daisy, the most of spirals occurs in Fibonacci numbers because divergence angle of succession in a single spiral arrangement approaches the golden ratio. The shape of the spiral depends on the growth of the elements generated sequentially. In mature-like phyllotaxis, when all the elements are the same size, the shape of the spiral is that of Fermat's spiral—ideally. That is because Fermat's spiral traverses equal annuli in equal turns. The full model proposed by H Vogel in 1979 is:

$$r = c\sqrt{n},$$

$$\theta = n \times 137.508^\circ,$$



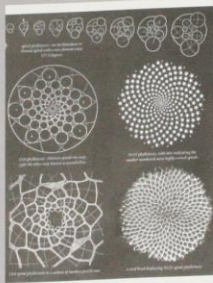
## THE GOLDEN SECTION NATURE'S GREATEST SECRET



Scott Olsen

## PHYLLOTAXIS PATTERNS BASED ON A SPIRAL

Emerging in nature in the leaf canopy, phyllotaxis has been examined in the spiral patterns of seeds in a sunflower head, petals in the stem, scales of pine cones, oak acorns, and other patterns exhibited in plants. In the leaf canopy, the spiral pattern observed in the spacing of leaves can also occur in compression. Angles have been used to measure the spacing of solid flowers in arrangement, and the phyllotaxis number is used to describe the arrangement. Approximately in 1750, Charles Bonnet named the same phyllotaxis pattern that was observed in the arrangement of leaves in a stem. He developed the concept of the divergence angle of what he called the "generic" spiral, measuring the distance of single phyllotaxis numbers. The Bonnet number also determined the spiral form and the divergence angle of phyllotaxis:  $137.5^\circ$  and  $144^\circ$ .





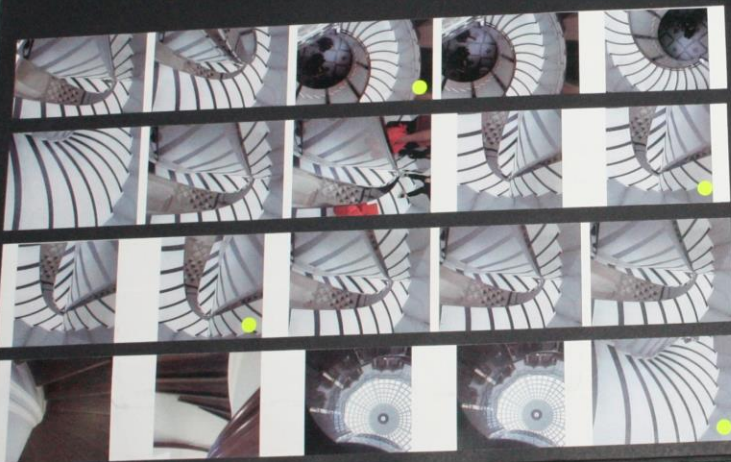
# Spiral Staircases

Spiral staircases are another example of the convergence of art and natural maths, particularly in an architectural setting. The spiral that they follow can be mathematically plotted. I decided to look at the 3 spiral staircases in Tate Britain, as seen on the contact sheets below. I was particularly interested to investigate how the spiral staircases look when studied from different angles.

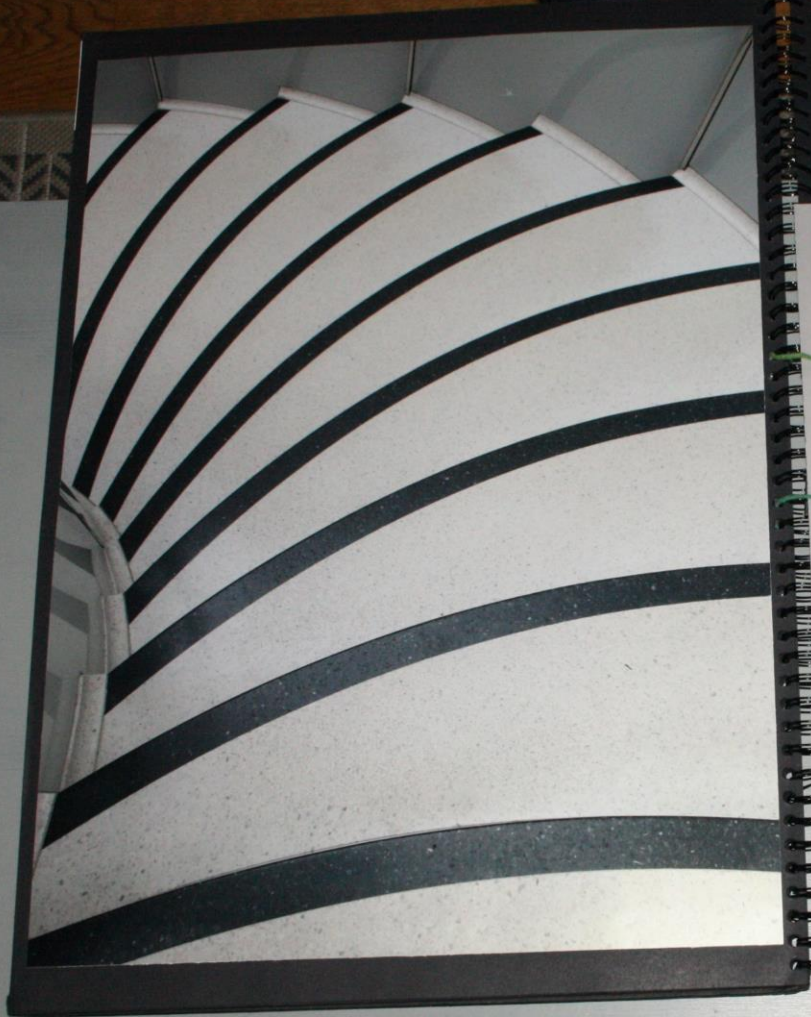
On the right hand page you can see two photographs of the central staircase in Tate Britain whose black and white lines create dramatic convergences and reflections.

## EXPONENTIALS AND SPIRALS an extended family of wonderful curves

It is more precise to say that the spiral staircase is a member of the family of logarithmic spirals, which are also known as equiangular spirals, and sometimes also as Archimedean spirals. These are the spirals that occur in nature, and are the most common type of spiral. They are also the spirals that are most closely related to the golden spiral, which is a special case of the logarithmic spiral.







## WEATHERING STEEL

Weathering steel is iron mixed with a specific blend of chemicals that allows it to rust quickly and uniformly without compromising its structure. As seen in these recent buildings a vibrant, chemically induced rust is practically produced in a controlled way.

The reflections in the building below create a contrast between the landscape and weathering steel.



As seen in experiments with capturing natural weathering.



## Chemical Convergence

Chemical convergence is the convergence between chemistry, nature and art. It can take a number of different forms, from using chemical reactions such as rusting to form part of an artwork or to paint in, to using hi level chemical structures as a subject for art, such as Crystals and Gemstones.

"A chemical substance is a form of matter that has constant chemical composition and characteristic properties. It cannot be separated into components by physical separation methods. It can, however, be separated into chemical components by chemical reactions, chemical synthesis, or alloying."

### Zadok Ben-David

Zadok Ben-David is a London based, award winning artist. He was born in Sayhan, Yemen in 1949 and immigrated to Israel in the same year. He graduated in advanced sculpture from St. Martin's School of Art in London and taught at the same institution from 1977-1982.

Seen on the right is one of 17 large-scale outdoor sculptures set up from October 23, 2012 - January 31, 2013 in the Singapore Botanic Gardens. This unique showcase represents Sothby's debut in the Lion City. The elaborate sculptures are set amid the flora of the Singapore Botanic Gardens, creating a sublime juxtaposition of manmade and natural beauty.



Studebaker, Methuen Valley, Washington, USA [Olson Kundig]

Invisible House, Blue Mountains Australia [Designed by Peter Stohberg]







# WEATHERING STEEL

Weathering steel is iron mixed with a specific blend of elements that allows it to rust quickly and uniformly without compromising its structure. As seen in these recent buildings a vibrant, chemically induced rust is produced in a controlled way.

My own experiments with capturing natural weathering →



self-designed home, LA, USA →



Here I started to explore 'uncontrolled' natural rusting processes  
↓ (also see by for night)



Home on River Ossa, Sussex (Designed by Sandy Randall) →



House List

Studio House, Methow Valley, Washington, USA [Olson Kundig]

Invisible House, Blue Mountains Australia [Designed by Peter Stohrer]

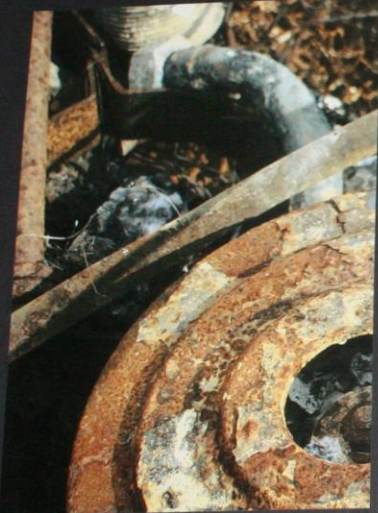
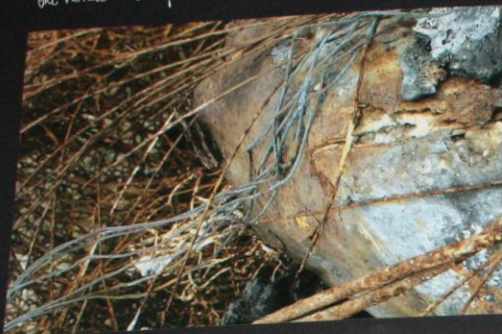








Below you can see where I have drawn inspiration from the "weathering steel", looking at natural examples of rusting, highlighting the varied colour palette that this process provides.



The convergence of the different objects show a whole, along with their different rust levels adds both depth and beauty to these photographs.

Further to this, I started to explore natural decay that occurred within a log pile, decaying on the floor of woodland.



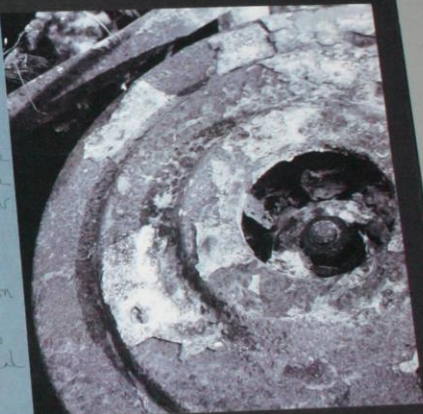
#### Laser cut texture experiment

Throughout my exploration of rusted materials I came across discoloured wheel hubs from cars and vehicles.

The texture of the oxidation was of particular interest to me so I therefore decided to explore how this could be developed through the medium of laser cut plywood.

I photographed the aerial view of a wheel hub and then vectorised it using 2-d design and engraved it on to laser ply.

The resulting patternisation develops the impact and effect of the beautiful convergence of the rusting process.









# Biological convergence

Biological convergence is the intersection between nature and art. It also explores the relationship between growth + decay.

→ Ansel Easton Adams (1903-1982)

IF 4-15-15 Artemisia, Munich to Tokyo Alpses #03-0083



Imogen Cunningham

Alongside Weston, Cunningham and Adams were part of f/64, a small group of 7 20th century San Francisco photographers who all shared a

common photographic style which is characterised by sharp focus and carefully framed images of natural forms, particularly leaves.

Inspired by this form of photography, I experimented with sharp focused, close up photography of natural forms, particularly looking at leaves and petals.

# Blossfeldt

"It would be only a slight exaggeration to say that photography in the botanical area owes more to the work of Karl Blossfeldt by a long way."



German photography pioneer Karl Blossfeldt (1861-1932) photographed plants and other biological forms so beautifully, and with such originality, that his work transcends the medium itself.

His primary motive for taking photos with such stark contrast was to provide a subject with which to teach his students to draw.



My photographs, inspired by Blossfeldt's sharp contrast and close up nature of dead seed heads



Above, I experimented with cutting the poppy seed head so seen below





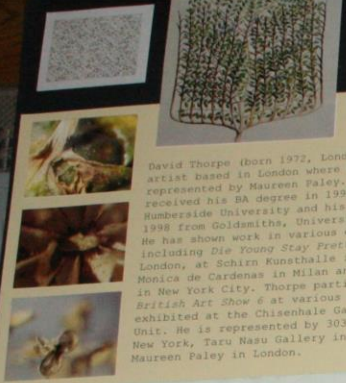




# David

# Thorpe

David Thorpe (born 1972, London, UK) is an artist based in London where he is represented by Maureen Foley. Thorpe received his BA degree in 1994 from Humberstone University and his MA degree in 1998 from Goldsmiths, University of London. He has shown work in various exhibitions including *Die Young Stay Pretty* at the ICA, London, at Schirn Kunsthalle in Frankfurt, Monica de Cardenas in Milan and Murray Guy in New York City. Thorpe participated in *British Art Show 6* at various venues. He exhibited at the Chisenhale Gallery with Unit. He is represented by 303 Gallery in New York, Taru Masu Gallery in Japan and Maureen Foley in London.



David Thorpe not only works in nature, but also in geometry, which he repeats over organic shapes with artificial perfection. This appears to be a commentary on society, where the perfection is valued to the extent of separating reality.



David Thorpe's exploration of plants from an artificial standpoint link closely to my explorations of Karl Blossfeldt, and this de-naturalising perspective drew me to create my own versions, both laser cut and painted with pen and watercolour. His forms also related to those used by Alexander Calder, particularly with the drawing on the right below, where the natural and artificial forms converge to create an object which is both intriguing and mysterious.

## David Thorpe: Future Perfect Project

David Thorpe was invited to contribute to the physical fabric of Hengrove in order to create a long-term legacy for the project. He designed a community orchard, which was planted on Whitchurch Village Green, Hengrove in November 2015. It is made up of fruit and nut trees and takes the shape of a cathedral, complete with nave, transept and apse. Planted by local children and residents of Hengrove, the orchard is designed to be a communal meeting place and stems from Thorpe's interest in utopian English traditions, with particular reference to the work of William Morris.





# CAROL BOVE



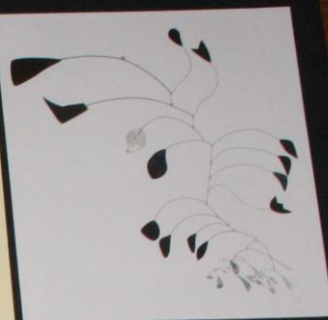
Carol Bove is known for her assemblages that combine found and made elements. Incorporating a wide range of domestic, industrial, and natural objects, her sculptures, paintings, and prints reveal the poetry of their materials. As the art historian Johanna Burton notes, "Bove brings things together not to nudge associative impulses into free play driven by the unconscious, but rather to conjure a kind of affective tangle that disrupts any singular, historical narrative."

Born in 1971 in Geneva to American parents, Bove was raised in Berkeley, California and studied at New York University. The artist joined David Zwirner in 2011. In 2015, *The Plastic Unit* marked her first solo exhibition at the gallery's London location. On view November 5 through December 17, 2016 at 525 and 533 West 19th Street in New York, David Zwirner will present *Folk Dots*, a solo show of the artist's new work.

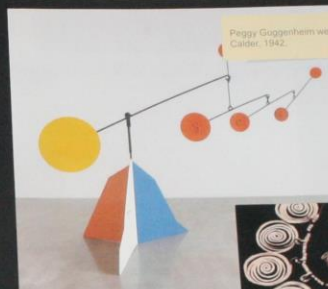
What interests me about her work is the way in which she integrates organic forms with harsh metallic and concrete ones, creating a biological and chemical convergence. Many of her sculptures also realise organic forms, much like those emulated by David Thorpe, and these can be seen on the right.



American artist Alexander Calder redefined sculpture by introducing the element of movement, first through performances of his mechanical Calder's Circus and later with motorized works, and, finally, with hanging works called "mobiles." In addition to his abstract mobiles, Calder also created static sculptures, called "stabiles," as well as paintings, jewelry, theater sets, and costumes. Many artists made contour line drawings on paper, but Calder was the first to use wire to create three-dimensional line "drawings" of people, animals, and objects. These "linear sculptures" introduced line into sculpture as an element unto itself. Calder shifted from figurative linear sculptures in wire to abstract forms in motion by creating the first mobiles. Composed of pivoting lengths of wire counterbalanced with thin metal fins, the appearance of the entire piece was randomly arranged and rearranged in space by chance simply by the air moving the individual parts.



# Alexander Calder



Peggy Guggenheim wearing earrings by Alexander Calder, 1942.



Calder, alongside his career as a sculptor, created over 1800 pieces of jewelry - often utilizing the principles of organic shapes and their movement when worn.



Each piece of his jewelry was hand crafted and unique bearing the signs and marks of the creator or craftsman - reminiscent in both style and philosophy to Bauhaus and the Arts & Crafts movement.







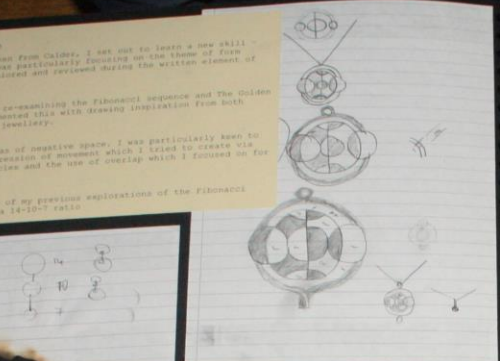
### Crafting my final piece

Building on the inspiration taken from Oshiro, I set out to learn a new skill - Jewellery making in silver. I was particularly focusing on the theme of form versus function which I had explored and perceived during the written element of this project.

I started the design process by re-examining the Fibonacci sequence and the Golden Ratio in particular, and implemented this with drawing inspiration from both Clara's linear sculptures and jewellery.

I also wanted to develop the idea of negative space. I was particularly keen to design a piece that gave the impression of movement which I focused on for the geometric nature of the circles and the use of overlap which I focused on for the pendant.

For the earrings, I drew accuracy of my previous explorations of the Fibonacci sequence, building the circle on a 14-10-7 ratio



### Development of 'form' - the technical aspect of craft and manufacture

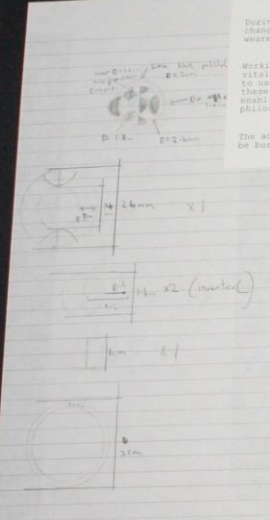
During the design and crafting process, I made a number of adjustments to my original design - some due to the changing nature of the form i.e. the design aesthetic as the piece was manufactured and some due to the technical (form) manufacturing process.

For the necklace pendant I had to adjust both the interlock and spacing and add in 4 additional silver support rods. I then cut out 2 of them as I felt they interrupted the aesthetic of the design.

During the design and manufacture process, I focused on scale and in particular, changing scale as I needed to create a pendant that worked with the scale of the wearer and consider the functionality aspects.

Working for the first time with silver created a number of issues. Firstly, it is vital when using silver to weld at a very high temperature. I also needed to learn how to use a laser welder and microscope due to the scale required. Building and learning these skills as part of the process moved me into the role of a 'craftsperson' enabling me to become part of the 'creation process' - reminiscent of the Bauhaus philosophy and the Arts and Crafts movement.

The advantages of working in silver included that if a mistake was made, the silver can be burnt down and re-used, making the process more costs effective.



### Displaying and staging

Having manufactured my silver jewellery, the next element I considered was how to stage and display my work.

Firstly I considered traditional jewellery staging - on a specialised monogram. However, I did not feel that this was successful and allowed the jewellery to become focused on the functionality, taking away from the considerations of form and design.

Next, I explored the idea of displaying the jewellery pieces on a found organic object - wood, linking back to some of my explorations of biological convergence. Although I felt that this was an improvement, I still felt that this did not fully progress the previous explorations that I had considered.

It was here that I particularly focused back to the work of Carol Bove, and in particular a critical review of an exhibition of hers in which he said:



### Displaying and staging

On a polished brass pedestal, topped by a small concrete slab, like a cushion on a stool, stands a welded armature. A delicate peacock feather, a little sea-shell, and some stuff I can't identify sprout from the angled branches. You could imagine a fabulous jewel or swanky watch there, presented in some terrifyingly upmarket window display.

Bove's is a game of staging and placement. For her, making art and showing it are part of the same activity. We get tangled in her complications and seduced by the elegance and wit of what she does, her generosity of spirit!

Adrian Glebe, 2011, review of Carol Bove exhibition



### Development of staging and displaying

Building on inspiration from Carol Bove, I investigated ways of developing and staging my silver jewellery.

I made paper model circular cages as a way of enclosing the jewellery - building and developing the negative space around it but also focusing on the idea of it being 'out of reach'. I also wanted to explore displaying contrasting crafted and manufactured pieces with found objects - drawing inspiration from all of the elements I had explored during the development of this piece in my journey through convergence.

I began to reference back to both biological convergence and chemical convergence and the contrast between these and the mathematical, manufactured convergence of the jewellery I had crafted.

I also wanted to explore an element of kinetic in my final piece, so explored how to bring some movement into the piece. As a result, I manufacture a number of elements, which together could form my final piece.

