HIPPOCAMPUS

Seahorse; Brain-Structure; Spatial Map; Concept

Submitted in partial fulfillment of the requirement for

Master of Fine Art

at

Rhodes University

By

Beth Diane Armstrong

Supervisor: Maureen de Jager

Co-Supervisor: Dr Ashraf Jamal

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ABSTRACT

Through an exploration of both sculptural and thought processes undertaken in making my Masters exhibition, '*Hippocampus*', I unpack some possibilities, instabilities, and limitations inherent in representation and visual perception. This thesis explores the Hippocampus as image (seahorse) and concept (brain-structure involved in cognitive mapping of space). Looking at Gilles Deleuze's writings on representation, I will expand on the notion of the map as being that which does not define and fix a structure or meaning, but rather is open, extendable and experimental. I explore the *becoming*, rather than the *being*, of image and concept. The emphasis here is on process, non-representation, and fluidity of meaning. This is supportive of my personal affirmation of the practice and process of art-making as research. I will refer to the graphic prints of Maurits Cornelis Escher as a means to elucidate a visual contextualization of my practical work, particularly with regard to the play with two- and three-dimensional space perception. Through precisely calculated 'experiments' that show up the partiality of our visual perception of space, Escher alludes to things that either cannot actually exist as spatial objects or do exist, but resist representation. Similarly I will explore how my own sculptures, although existing in space resist a fixed representation and *suggest ideas* of other spaces, non-spaces; an in-between space that does not pin itself down and become fixed to any particular image, idea, object or representation.

I declare that this thesis is my own work and that all the sources I have used have been acknowledged by complete references. This thesis is being submitted in partial fulfillment of the requirement for Master of Fine Art at Rhodes University. I declare that it has not been submitted before for any degree or examination at another university.

Beth Diane Armstrong
February 2010

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Thank you to my friends for supporting me in the hard times and sharing with me in the good. I am blessed to have such wonderful friends. I am touched by the number of individuals who have reached out and selflessly given of their time and resources to make the completion of my Master's Degree possible. I sincerely thank you.

And finally I would like to thank my family for having tremendous faith in me, love for me and continual, unbreakable confidence in my endeavors. Thank you mom and dad, without your support I would not have been able to achieve this.

LIST OF ILLUSTRATIONS

NOTE: All photographs of my practical work are taken by myself, unless stated otherwise.

INTRODUCTION

I began my Masters doing extensive research on chaos theory, fractal systems and optical illusions. These interests were largely un-directed – a meandering intrigue, one could say. I was seeking an expression that encapsulated the subtleties of my curiosity; I had little interest in attempting to create descriptive or representational artworks of these distinguished and somewhat grandiose theories. What held my interest in chaos theory were ideas of an intangible and elusive moment when order is spun off course into chaos and when chaos suddenly and inexplicably reorders itself. Further, I became interested in fractal systems' self-similarity: a fractal's form or pattern has the same shape as the parts that make it up; a sub-structure, at every level analogous or identical to the overall structure. More specifically, I was interested in the *idea* of breaking down and scrutinizing an object, whether physical or an object of interest, only to find that it keeps referring to itself, re-presenting itself, pulling back in and folding over and over again. Also that this representation does not seem to have a clear beginning or end, but rather forms a continuous loop with no apparent origin or purpose. Is the repetition and re-presentation of itself (an original), then, not possibly an illusion – a reality misperceived, a perception misinterpreted? A trickery, a vision, a dream, a misunderstanding?

At some point during my research, a man-sized seahorse appeared in my bed. He would lie to my left and wrap his tail around me urging me, with persuasive little wriggles, to roll around with him. His visits were relentless; night after night, the convoluted dynamics would play themselves out, and I was both intrigued by his presence and exhausted by the sleeplessness it elicited. Describing the experience at the time, I said:

> Purnippal[1] is a seahorse, his intentions are ambiguous.
> He may come into your bed at night; he may not.
> He may wrap his tail around you; he may not.
> He may ask you to roll around with him; he may not.

[1] The name 'Purnippal' has no significance other than being the name that accompanied the man-sized seahorse, his name being as evasive as his presence.

This strange, detached dream-vision was the start of a sudden, undeniable and irrational obsession with seahorses. I decided to make this man-sized seahorse, hoping that by bringing him to life I would get him out of my bed. From the persistent and precarious image of a seahorse developed a body of work. My exhibition, '*Hippocampus*', has not grown out of any particular idea or theory, just as I hope the theoretical content of this thesis does not define the work, but merely provides an entry point into understanding it. As Parr (2005: 277) reminds us: 'Theory does not represent or "speak for" practice, any more than practice "applies" theory'. He refers instead to action – theoretical and practical action, 'connected in networks and relays'.

In this thesis, I will look primarily at the artwork of Maurits Cornelis Escher[2]. Although he is a graphic artist and I a sculptor, his work is similar to mine in many respects, particularly in terms of play with space, perception and representation. As Schattschneider (2004: 239), when explaining Escher's interests, says:

> His prints portray and even exploit the ambiguity with which humans must constantly struggle as they observe, represent, interpret and try to understand the world that surrounds them. How can I understand infinity? Is there a line between two and three dimensions? Is what I see 'real?' What thoughts does a shape evoke? Does the shape of the background have its own identity? Can I understand or experience anything without knowing its opposite?

Escher's work provides interesting points of comparison and contrast with which to elucidate a contextualization of my work. I will also primarily, but not exclusively, look at the writing of Gilles Deleuze and Felix Guattari[3] as their theories best help me explicate a number of ideas, especially concerning notions of representation. As O'Sullivan (2007: 9) notes: Deleuze 'writes precisely against representation'. He writes as an experiment in thinking 'differently, "beyond" representation' (O'Sullivan 2007: 3).

[2] Maurits Cornelis Escher, a Dutch graphic artist, was born on June 17, 1898 and died on 27 March 1972. He is known for his often mathematically inspired woodcuts, lithographs, and mezzotints. These feature impossible constructions, explorations of infinity, architecture, and tessellations (Schattschneider 2004: 2). I will hereafter be referring to M. C. Escher as Escher.

[3] Deleuze (1925 – 1995) was Professor of Philosophy at the University of Paris VIII. He is a key figure in post-structuralism and one of the most influential philosophers of the twentieth century. His co-author Felix Guattari (1930 – 1992) was a psychoanalyst at the la Borde Clinic, as well as being a major social theorist and radical activist (Deleuze & Guattari 2004: back cover).

Typical of the post-structuralist philosophers and thinkers such as Jacques Derrida and Michel Foucault, the value of Deleuze's contribution to critical thinking is his insistence on *difference* and *becoming*. As Colebrook (2002: 3) elaborates:

> Instead of studying life in closed systems, as the structuralists had done, post-structuralists looked at the opening, excess or instability of systems: the way languages, organisms, cultures and political systems necessarily mutate or *become.*

Not only structuralism, but also the history of Western thought, is based on being and identity, featuring a general preoccupation with an idea of the One, an original, a beginning and an end. Consequently, notions of difference and becoming are placed *within* some ground or foundation. Contrarily, as Colebrook (2002: 3) explains: 'Deleuze and those of his generation sought to conceptualise both difference and becoming, but difference and becoming that would not be the becoming *of* some being'.

For Deleuze, our 'daily use of concepts follows the model of representation and opinion, where we assume that there's a present world that we then re-present in concepts' (Colebrook 2002: 16). His challenge is, rather than seeking to uncover what something *means*, to seek what it *does*. My referral to the thoughts of Deleuze serves therefore as a means to support and unpack certain aspects of my working processes that seem to hint at notions of non-representation, or at least at fluidity rather than fixity of meaning. Moreover, it is used to show up my undesired yet seemingly inescapable preoccupation with the ordering, meaning and representation of my work. I face a tension created by, on the one hand, being reluctant to ascribe 'meaning' to my work, believing at times that, as objects, they cannot and do not have meaning. On the other hand, I concurrently find myself calculatedly trying to elucidate a reading (a reason, at least) for the production of these sculptures.

In Chapter One, 'Seahorse', I will outline in detail the development of my practical work, providing an anecdotal, chronological and methodical account of the sculptures that I have made. The reason for this is twofold. Firstly, an understanding of the sculptural *processes* of my work is integral, I believe, to the concepts explored in the

rest of the thesis. Secondly, I hope that a 'mapping out' of both the intellectual and physical development of the sculptures will help in later unpacking the tension spoken of above. I will not explore, as such, any theoretical concerns in Chapter One.

Seahorses[4] are among the most unusual of fishes and probably the most 'unfish-like' (Kuiter 2003: 2). They belong to the genus, '*Hippocampus,* from the Greek words *hippos* meaning horse and *campus* meaning sea-monster' (Lourie, Vincent & Hall 1999: 3). Sharing this name (because of its similarity in shape) is the paired brain structure called the hippocampus. Part of the limbic system, it is located in the medial temporal lobes of each brain hemisphere. There is continual extensive research going into discovering the role the hippocampus plays in brain functioning. One view that has 'captured considerable attention is…that the hippocampus mediates a neural representation of physical space, that is, a cognitive map' (Wood, Shapiro, Dudchenko, Heikki & Eichenbaum 1999: 209)[5].

In Chapter Two, 'Hippocampus', I will look at why discovering the link between the seahorse and the hippocampus of the brain was fortunate and instrumental in the theoretical contextualization of my work. I will look mainly at John O'Keefe and Lynn Nadel's cognitive map theory as they were the first to suggest that a map of space could actually exist in the brain. I will then compare this 'physical' map with another mapping system, the rhizome – a 'concept tool' that Deleuze speaks of to explain systems that are without the physicality of representation or the fixity of structure – as a means of proposing new ways to think about space, representation and perception.

[4] 'Here is a fish with the head of a horse, the ability to change colour like a chameleon, the prehensile tail of a monkey, an armor-plated body like an armadillo, a kangaroo's pouch, and turreted eyes like a lizard' (Giwojna 1990: 6). Seahorses are bony fishes (teleots), complete with gills, fins and a swim-bladder. Among the approximately 150 recorded names for seahorse species, there are roughly 35 real seahorse species, such as the *Hippocampus erectus, Hippocampus campelopardalis, Hippocampus abdominalis,* and *Hippocampus capensis* (also known as the Knysna seahorse) – a species found in the Knysna, Swartvlei and Keurbooms River mouths on the South African coast. They range in size from about 10-20mm to 300mm (Vincent 1996: 4). Seahorses are monogamous. 'Virtually all seahorse species studied thus far form long-term faithful pair bonds…One male and one female mate repetitively and exclusively, eschewing opportunities to interact with non-partners' (Lourie, Vincent & Hall 1999: 19). The male seahorse provides the most extreme example of parental care yet known, for the males become pregnant. The females still produce the egg and the male the sperm so the males are entirely male, despite brooding the young (Lourie, Vincent & Hall 1999: 15).

[5] I will hereafter refer to '(Wood, Shapiro, Dudchenko, Heikki & Eichenbaum 1999)' as '(Wood et al: 1999)'.

In Chapter Three, 'Process', I will look at different procedures involved in making this exhibition, '*Hippocampus*'. Each chapter heading will explore a different but related process[6], namely: Narrative/Structure, Binaries, Measurement and Repetition.

In Chapter Four, 'Space', I will be specifically looking at the sculptural works that I have made, rather than process or intention. By looking at the visual properties of both my work and that of Escher, I will explore physical and conceptual space of representation by looking at some possibilities and limitations of three-dimensional space perception. Further, I will suggest the precariousness of visually representing something that is either un-representable (as in something that could not possibly exist in space), or something that resists being represented as an object occupying and defining the space that it inhabits.

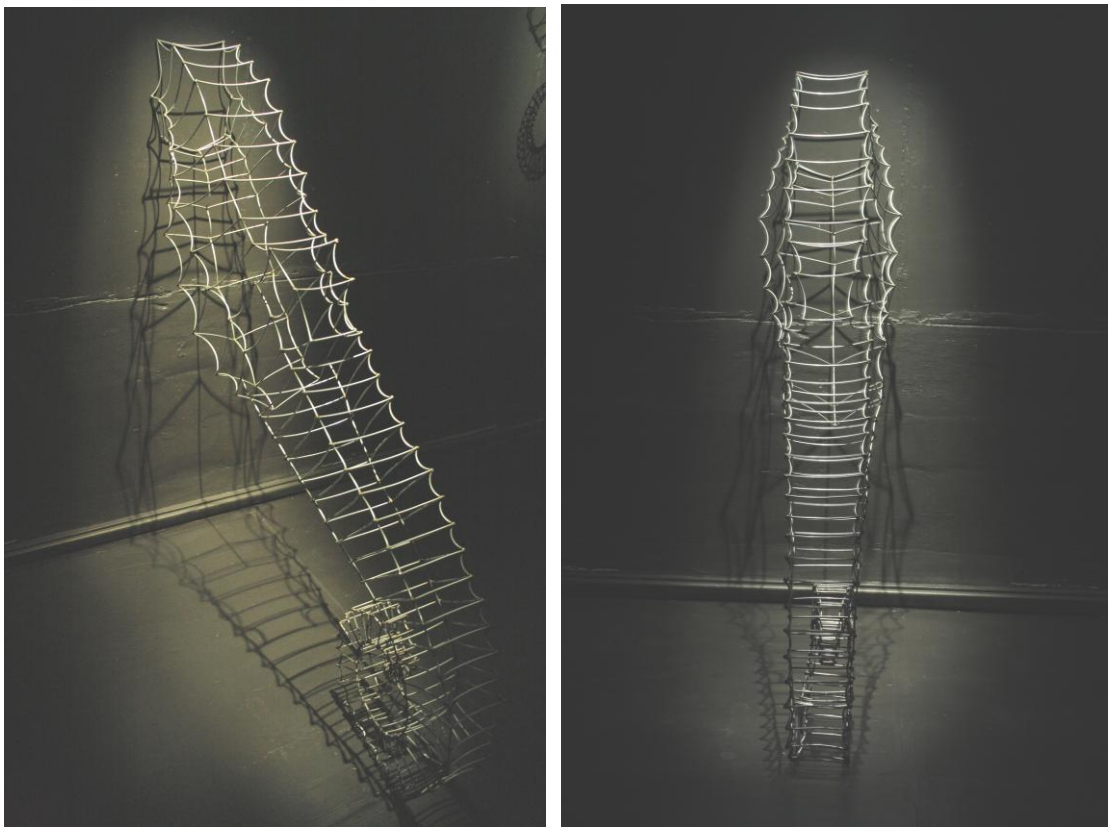
I will conclude in four parts by suggesting a general convergence of all the concepts explored in the thesis and then by further elaborating on three key ideas. In 'Towards a Representation', I will suggest one structural and one conceptual element that enable and facilitate a body of work that does not necessarily defy but resists and plays with the notion of representation. In 'On a Map' I will recap the notion of the Hippocampus as seahorse; brain-structure; spatial map and concept such that it does not pin down but experiments with its meaning. In 'In the Beginning', I will return to the quiet and subjective *space* of a man-sized seahorse in my bed, an impetus, intention and action.

[6] The processes spoken of here include both physical, sculptural processes as well as thought processes that I explored in the making of the work.

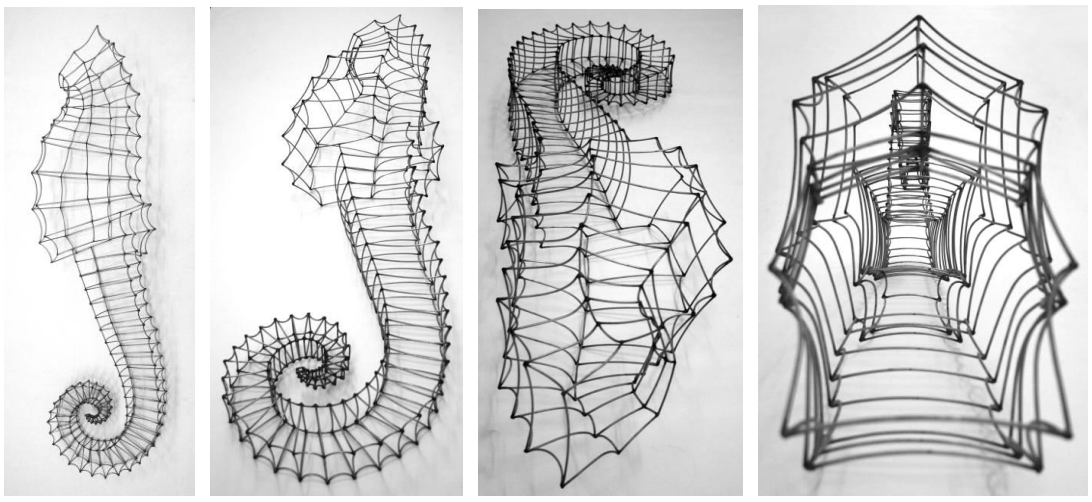
CHAPTER ONE

SEAHORSE

A Man-sized Seahorse



Figures 1.1 – 1.2. Exhibition installation: Beth Armstrong, *Hippocampus 1* (2009), welded 4mm wire, 200 x 38 x 54 cm



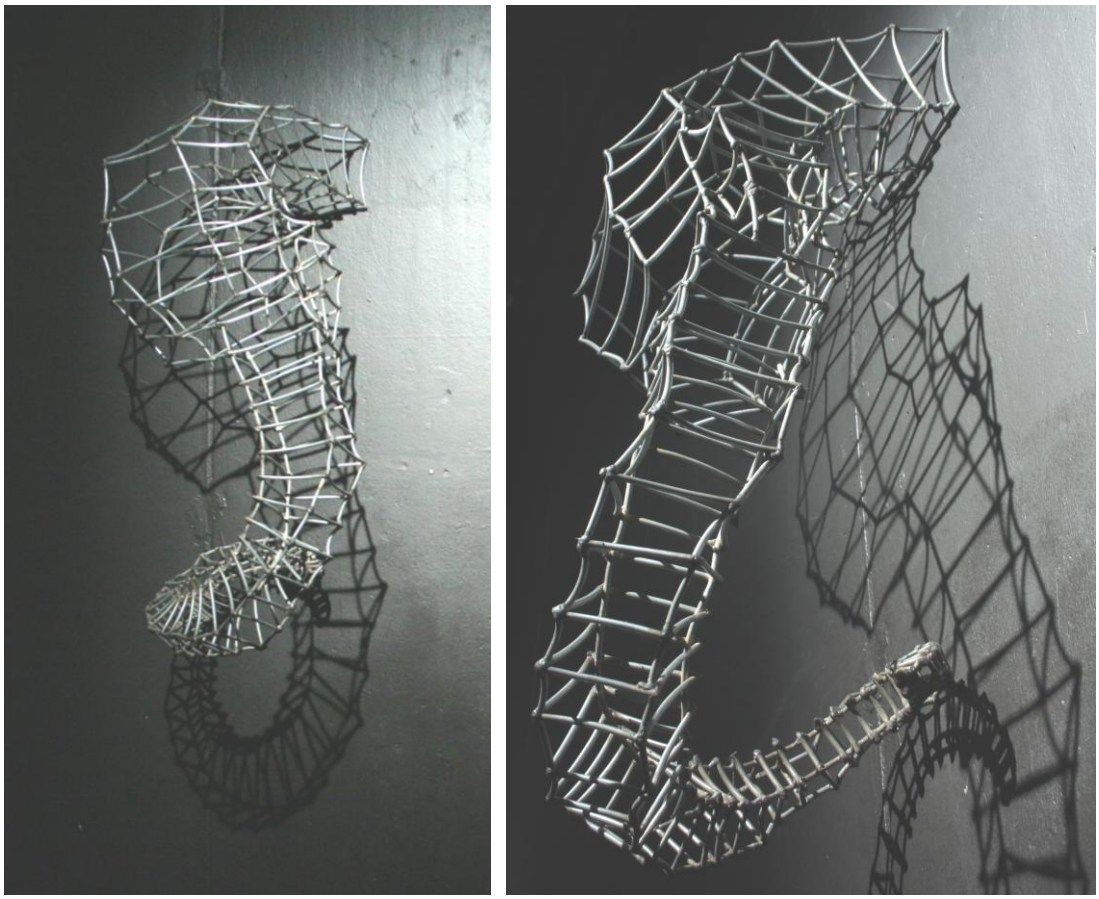
Figures 1.3 – 1.6. Work in progress: Beth Armstrong, *Hippocampus 1* (2009), welded 4mm wire, 200 x 38 x 54 cm

Once I had decided to make the man-sized seahorse (*Hippocampus 1* 2009: Figs. 1.1 – 1.6)[7], a few months of meticulous planning and preparation ensued before it was actually constructed. I wanted to make it as representative of a seahorse as possible. I filled books with mathematical calculations and measurements, working out the precise length and curvature of each piece of wire. I drew and redrew templates for each segment of the seahorse, built a maquette to see if my proportions were sound and, once satisfied, constructed the large one. My initial plan was to make the entire seahorse with head, skin and pregnant stomach. The 4mm welded wire would compose the skeletal structure over which the detail of the seahorse would be built out of semi-transparent resined fiberglass. While making this sculpture I was also making plans and taking body casts for my initial idea of an exhibition in which this seahorse would be the focal point – a representation of the 'other within'. I imagined the man-sized seahorse facing a fat man pointing a water pistol at it; a girl in a seahorse costume holding a gaudy foil balloon with the words 'I love you' written on it; a man with a stumpy abdomen being fitted with a prosthetic seahorse tail and a small child with a fragile seahorse fin sticking out of her back. At the time these human-animal interactions were symbolic to me of the various states of dissociation, estrangement or integration one may feel with an image of the self; the animal/seahorse being an 'other', a difference, against which a 'self' could be defined.

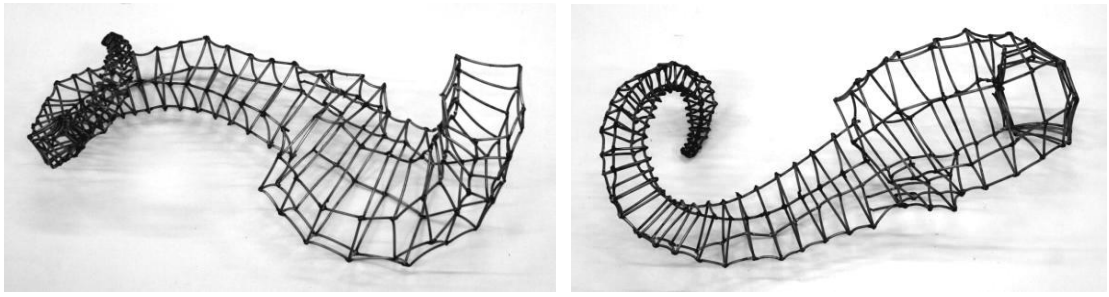
A Change in Direction

The first significant turn in my practical work happened one evening when I was suddenly compelled to break away from the painstaking precision required to make the first seahorse and to weld together some of the off-cut wire; the unmeasured, scrap, leftover. I felt stifled and frustrated by the symmetry and rigidity of my working processes and this more impulsive and less calculated way of working came as a pleasant surprise. By the end of that evening I had made a strange, small, contorted figure that was evidently still a seahorse but much more gestural in nature (*Hippocampus 2* 2009: Figs. 2.1 – 2.4).

[7] I have included in this thesis two types of documentary photographs of my sculptures. Firstly, photographs of the final installation of the exhibition, '*Hippocampus*'. Here the wire sculptures were displayed in a black room (The rehearsal room in the Grahamstown Monument building) with dramatic lighting such that dense shadows were cast on the floor and walls. Secondly, I include photographs of the works in progress where they are seen against a white background with little to no shadow. I include these photographs as it may at times be difficult to isolate the form of the sculptures from their shadows or other sculptures in the installation images.



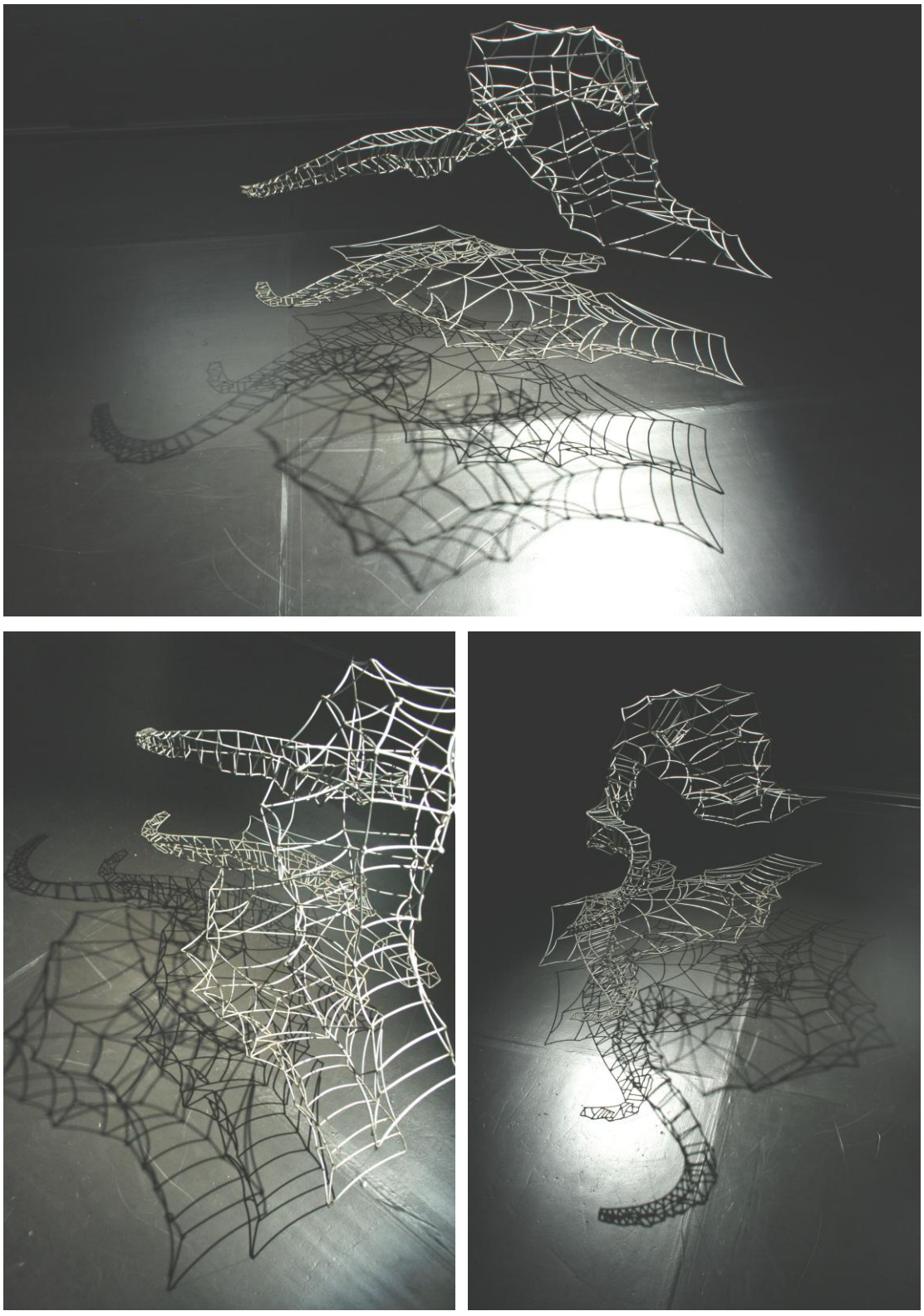
Figures 2.1 – 2.2. Exhibition installation: Beth Armstrong, *Hippocampus 2* (2009), welded 4mm wire, 71 x 29 x 3 cm



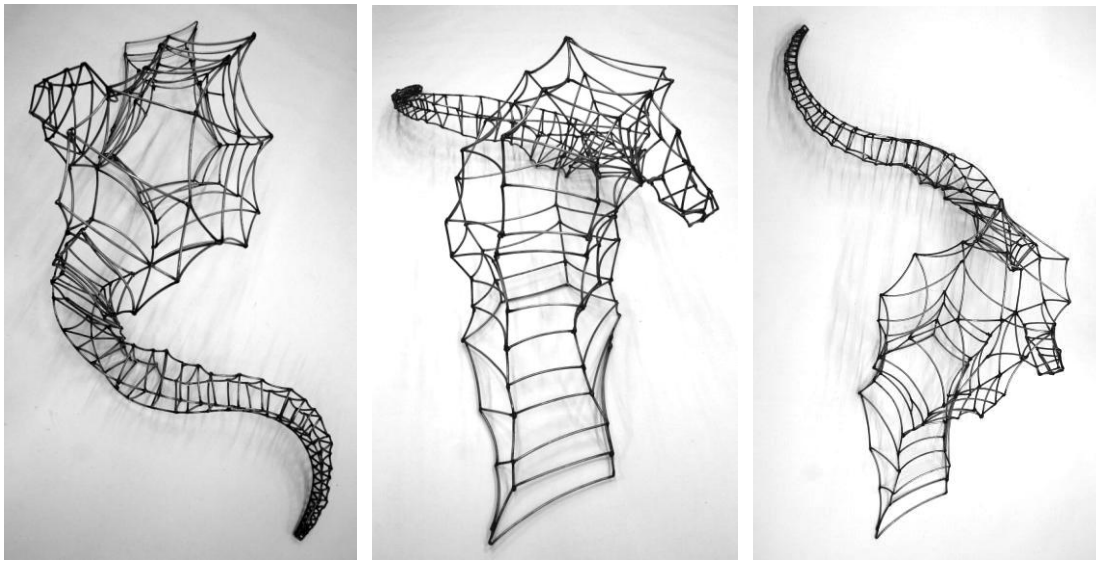
Figures 2.3 – 2.4. Work in progress: Beth Armstrong, *Hippocampus 2* (2009), welded 4mm wire, 71 x 29 x 32 cm

Excited and intrigued by this freer way of working I began another sculpture (*Hippocampus 3* 2009: Figs. 3.1 – 3.6) that was even more gestural, loose and undirected. Unlike the first sculpture, it was not premeditated. I was unsure how this change in direction would fit in with my envisioned exhibition but I was intrigued and so I continued. The sculptures that followed (*Hippocampus 4* & *5* 2009: Figs. 4.1 – 5.4) were created through premeditation coupled with the freedom of allowing the wire to dictate its form as much as I was trying to constrain it. My methods varied for

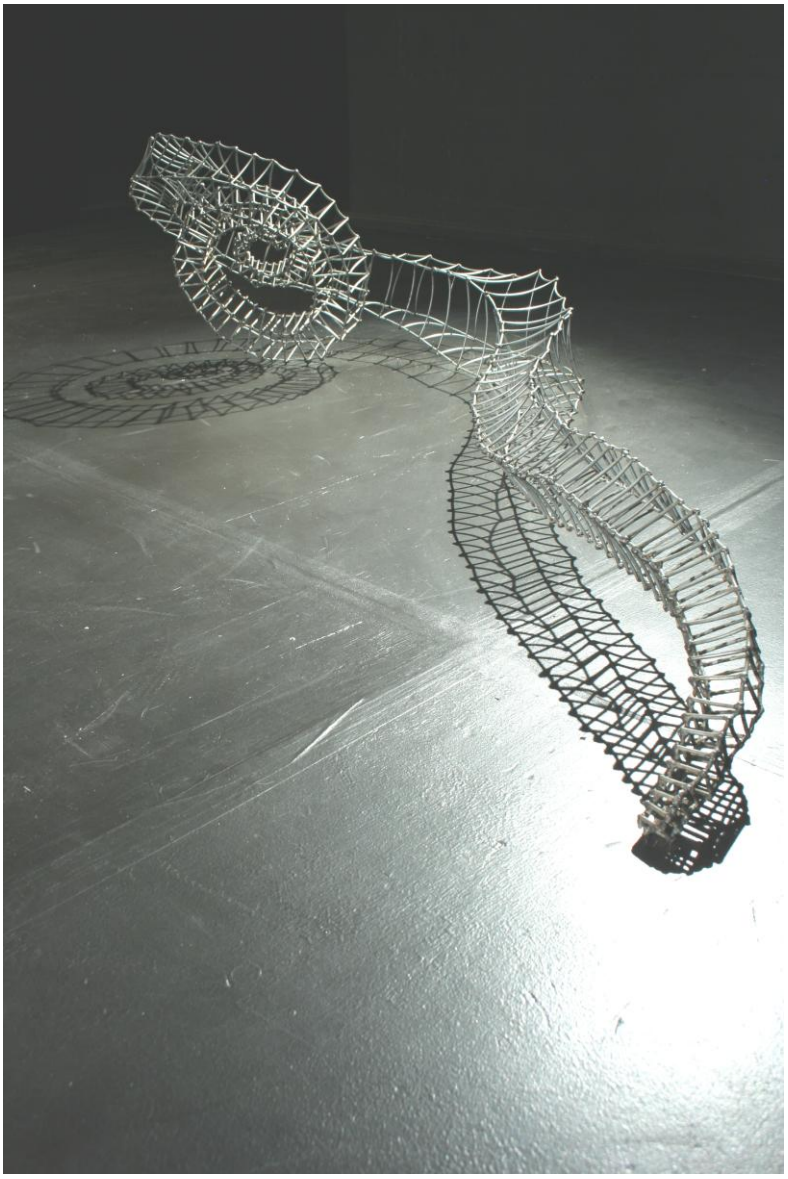
each sculpture. Sometimes I found myself measuring every piece of wire, planning, calculating and thus making thoroughly intentional interventions. At other times I worked with a 'looser hand', more gestural, less deliberate.

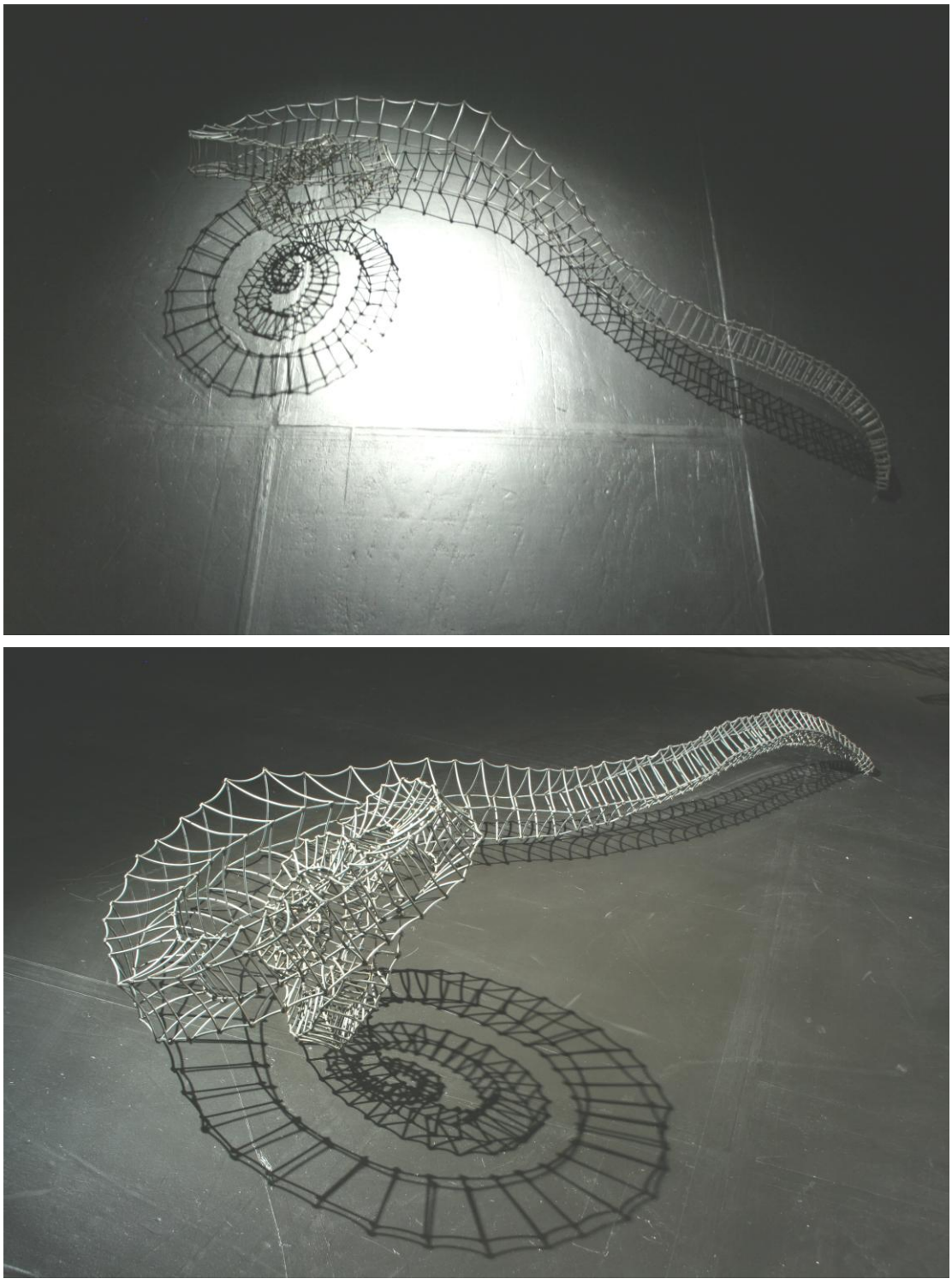


Figures 3.1 – 3.3. Exhibition installation: Beth Armstrong, *Hippocampus 3* (2009), welded 4mm wire, 138 x 53 x 50 cm

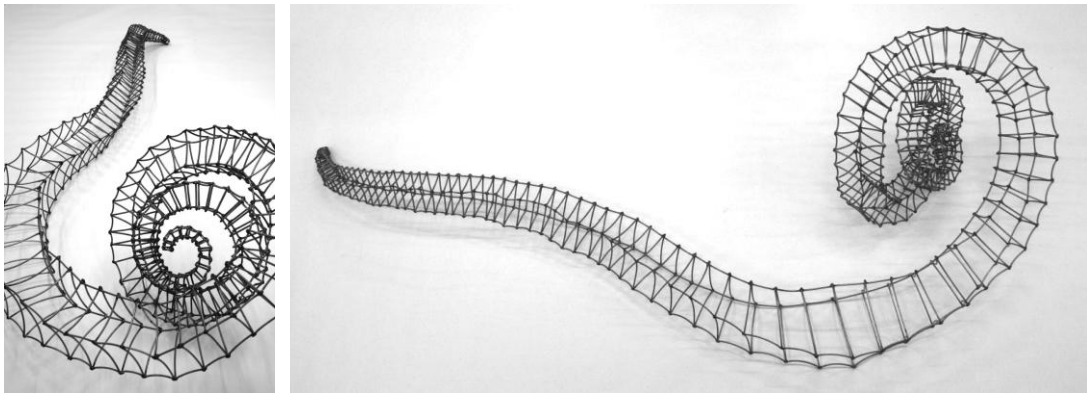


Figures 3.4 – 3.6. Work in progress: Beth Armstrong, *Hippocampus 3* (2009), welded 4mm wire, 138 x 53 x 50 cm

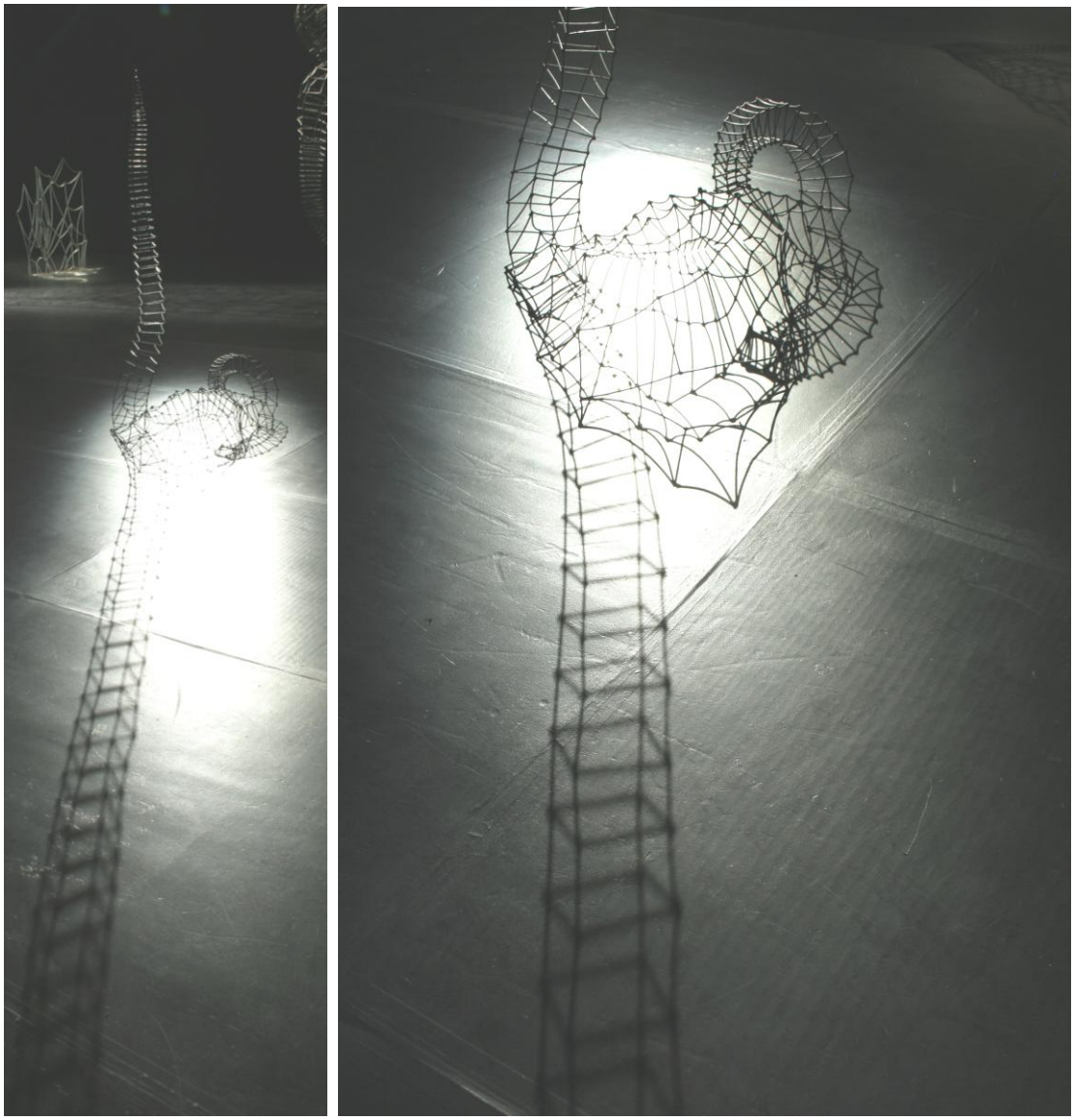




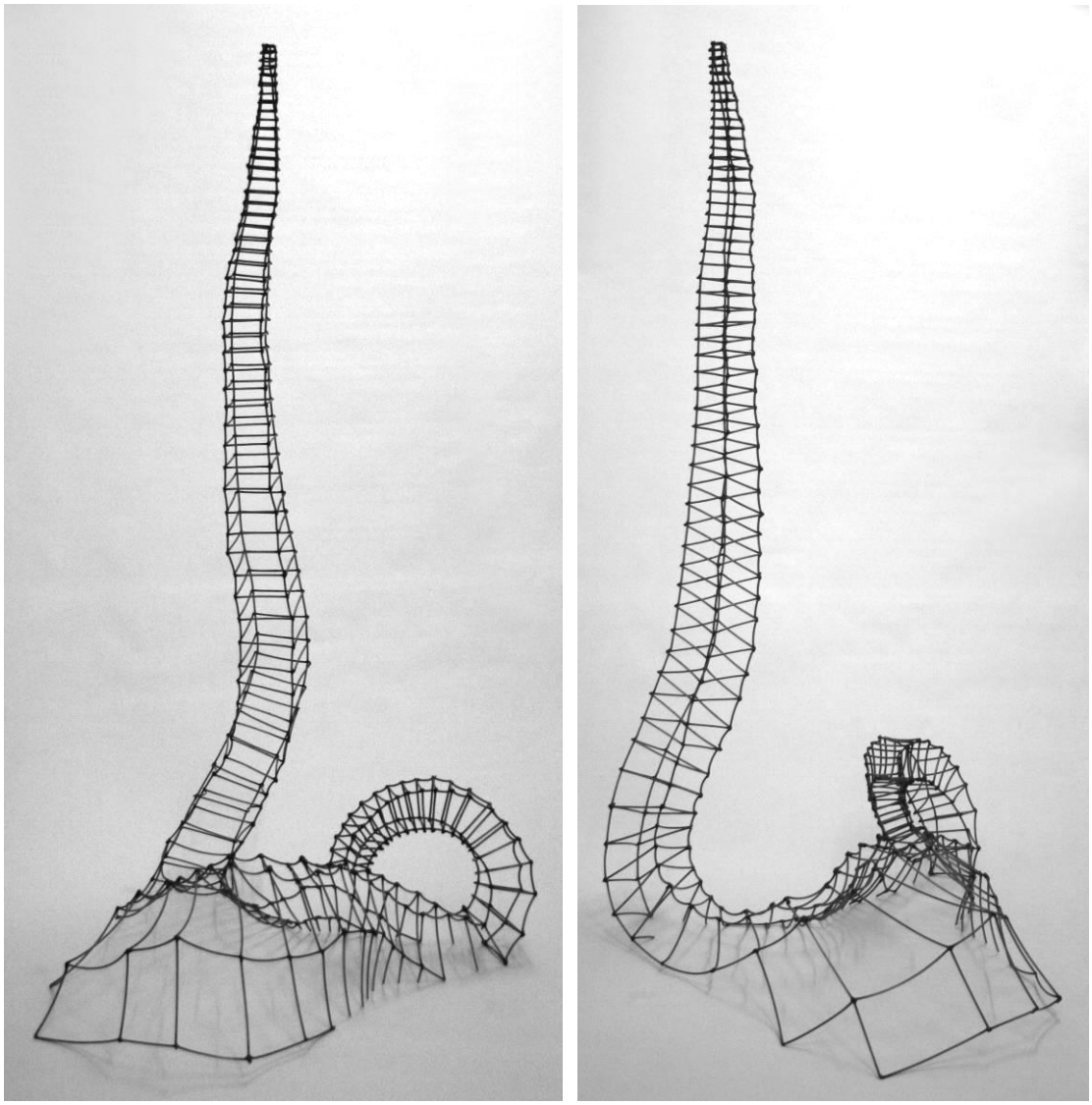
Figures 4.1 – 4.3. Exhibition installation: Beth Armstrong, *Hippocampus 4* (2009), welded 4mm wire, 207 x 90 x 51 cm



Figures 4.4 – 4.5. Work in progress: Beth Armstrong, *Hippocampus 4* (2009), welded 4mm wire, 207 x 90 x 51 cm



Figures 5.1 – 5.2. Exhibition installation: Beth Armstrong, *Hippocampus 5* (2009), welded 4mm wire, 173 x 104 x 102 cm



Figures 5.3 – 5.4. Work in progress: Beth Armstrong, *Hippocampus 5* (2009), welded 4mm wire, 173 x 104 x 102 cm

Although the first seahorse sculpture[8] can be seen as an abstraction of sorts – a generalisation, a simplification, a 'decapitation' of seahorse – the subsequent works moved away, in varying degrees, from being unambiguous representations of seahorses. They were becoming something else; something more, or less, perhaps. Nonetheless, they always retained the rudimentary material and structural elements of the first sculpture – the welded 4mm wire, the quality of the lines, curves and bulging and tapering concentric segments and shapes. At this stage in the development of the body of work I was certain that these sculptures would still be 'finished' with a skin

[8] It is necessary for me to clarify my continual reference to the 'first seahorse'. I do not consider this 'first sculpture' as having any more significance than the other sculptures, other than as a means from which to expand an explanation, make comparisons and draw similarities.

and interacting with and contrasted to the presence of a human; a juxtaposition of man and creature. My initial 'carnivalesque' ideas about the fat man and girl in costume had fallen away. I now imagined a quieter space; a room full of seahorse-like creatures and amid them a seated self-portrait with the small, contorted seahorse (*Hippocampus 2* 2009: Figs. 2.1 – 2.4) on my lap: a self-portrait with seahorses.

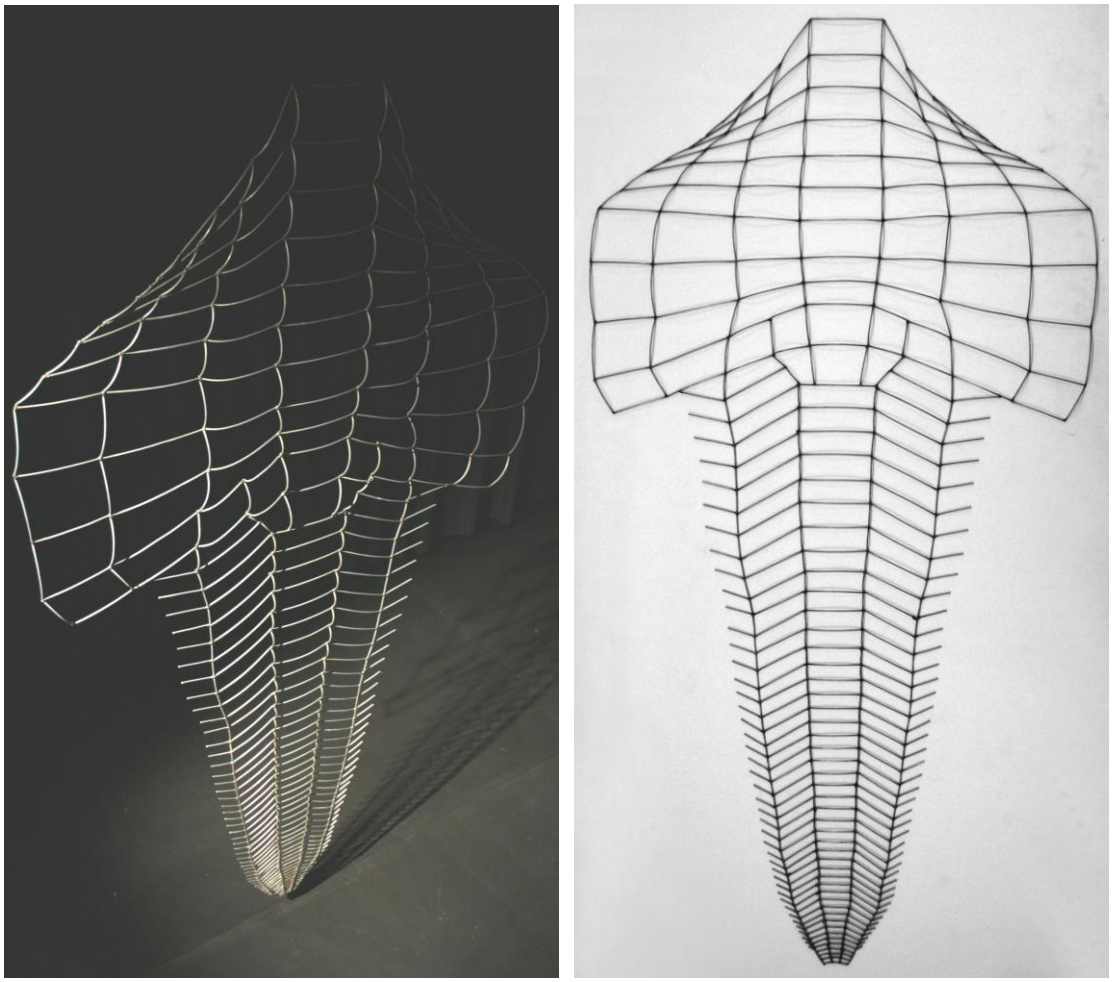
For a long time I experimented with many different substances that would form the sculptures' skins and give them volume and a discernibly three-dimensional form. I was aiming for a semi-transparent appearance so that one could see the wire structure within, but nothing I tried worked the way I wanted it to because the wire within was never visible enough. Although difficult, I had to finally admit and accept that what interested me most about these sculptures was the quality of the line of the wire itself rather than the quality of volume and weight that is commonly characteristic of sculpture as a medium. My works are like diagrammatic drawings in the air; skeletal references of sculptures not yet made. This acknowledgement was a liberating moment in the development of the body of work.

By this point, I had developed a vague sense of what I was dealing with: sculptures that are both diagrammatic and volumetric, figurative and non-figurative; sculptures that seem to be present in space but simultaneously immaterial. This ambiguous tension became the focus of my thought. The self-portrait quietly slipped away as I became immersed in the quality of the wire, the curves, the segments, the shapes.

A Significant Development

The next sculpture I made (*Hippocampus 6* 2009: Fig. 6.1 – 6.2) marks a significant shift in the development of my work as it opened up both conceptual ideas as well as a direction for subsequent sculptures. I re-cut all the pieces of wire for the initial seahorse and created a splayed skin, as though the seahorse was cut down the middle and flattened out. I was intrigued that this time my meticulous measuring and cutting of wire resulted in a sculpture that, although very premeditated, symmetrical and rigid, had escaped how I imagined it to look once complete. The assemblage of the wire resulted in visual illusions that I had not expected: although it is flat, it appears at times to have volume/form; to be three-dimensional. The eye has difficulty seeing it in its flatness. Visual space becomes confused as the reality of what the eye sees is not

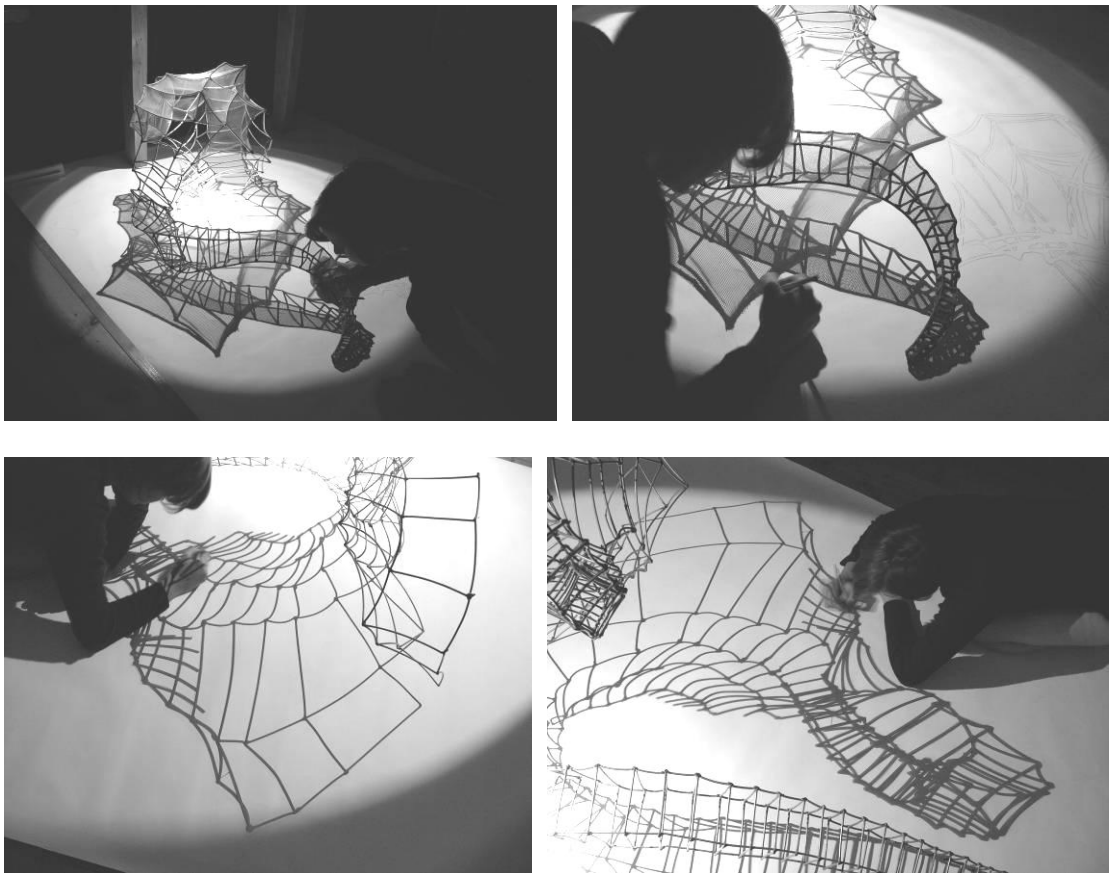
what is being perceived. This was the first time a sculpture had become so far removed from the ubiquitous seahorse image. Every single piece of wire is exactly the same length and curvature of the first seahorse, yet the altered assembly of those material elements resulted in something remarkably less recognisable.



Figures 6.1 – 6.2. Exhibition installation and work in progress respectively: Beth Armstrong, *Hippocampus 6 (*first seahorse's skin*)* (2009), welded 4mm wire, 267 x 139 x 3 cm

An Interest in Shadow

Curious to see what the other sculptures would look like on a flat plane, I cast their shadows and drew them (Figs. 7.1 – 7.4). The drawings of the shadows formed interconnecting webs, a map, perhaps, a biological structure (Fig. 7.5). I then drew into these lines with permanent marker (Figs. 7.6 – 7.9), translating them into drawings that I could further translate into flat shadow sculptures (Figs. 7.10 – 7.11). I thereafter cut pieces of wire to match and replace each drawn line (Figs. 8.1 – 8.5) and welded them together (Figs. 8.6 – 8.7).



Figures 7.1 – 7.4. Drawing the sculptures' shadows.

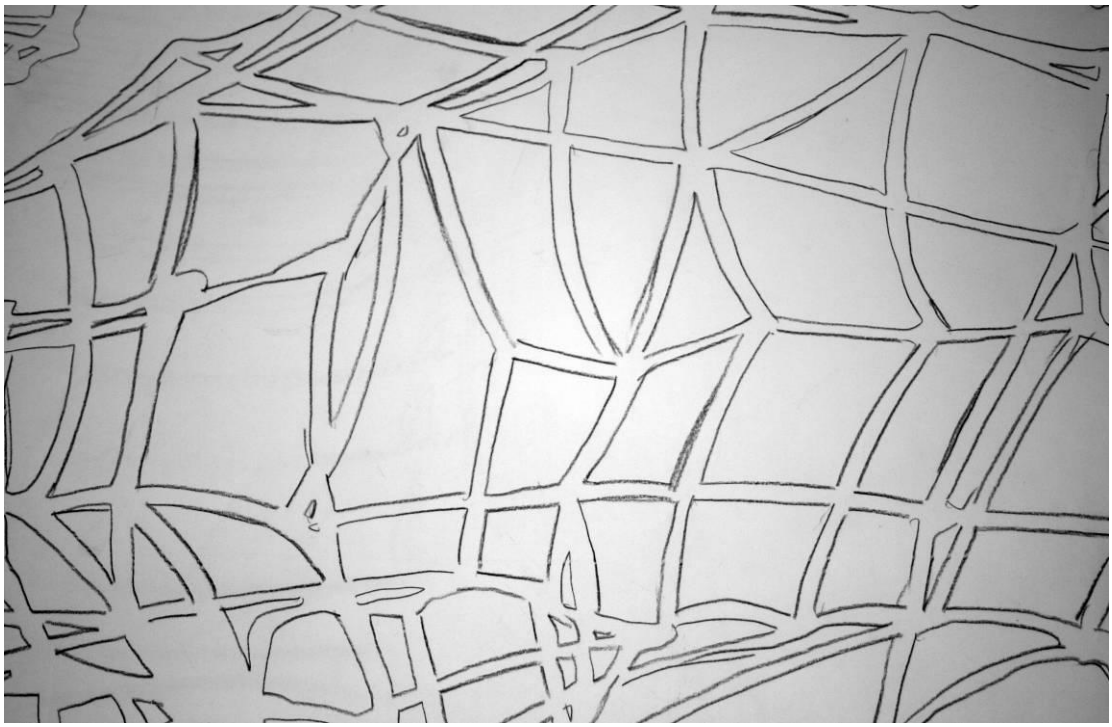
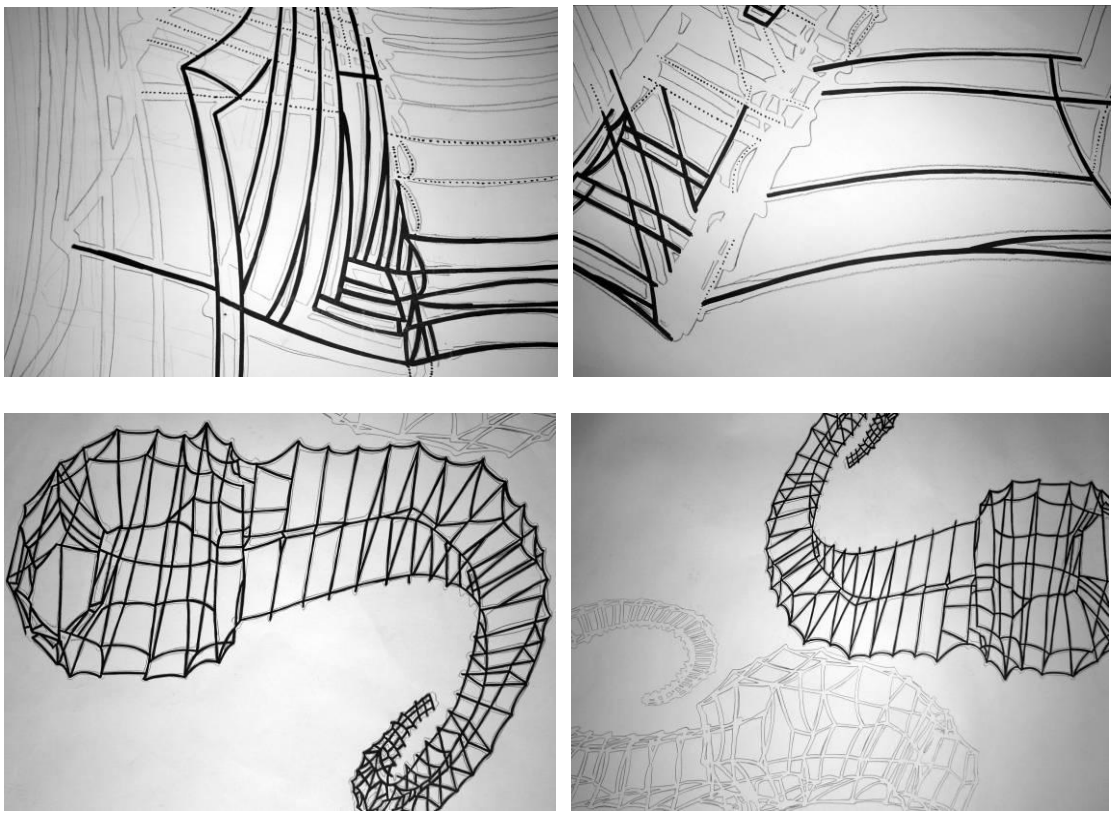
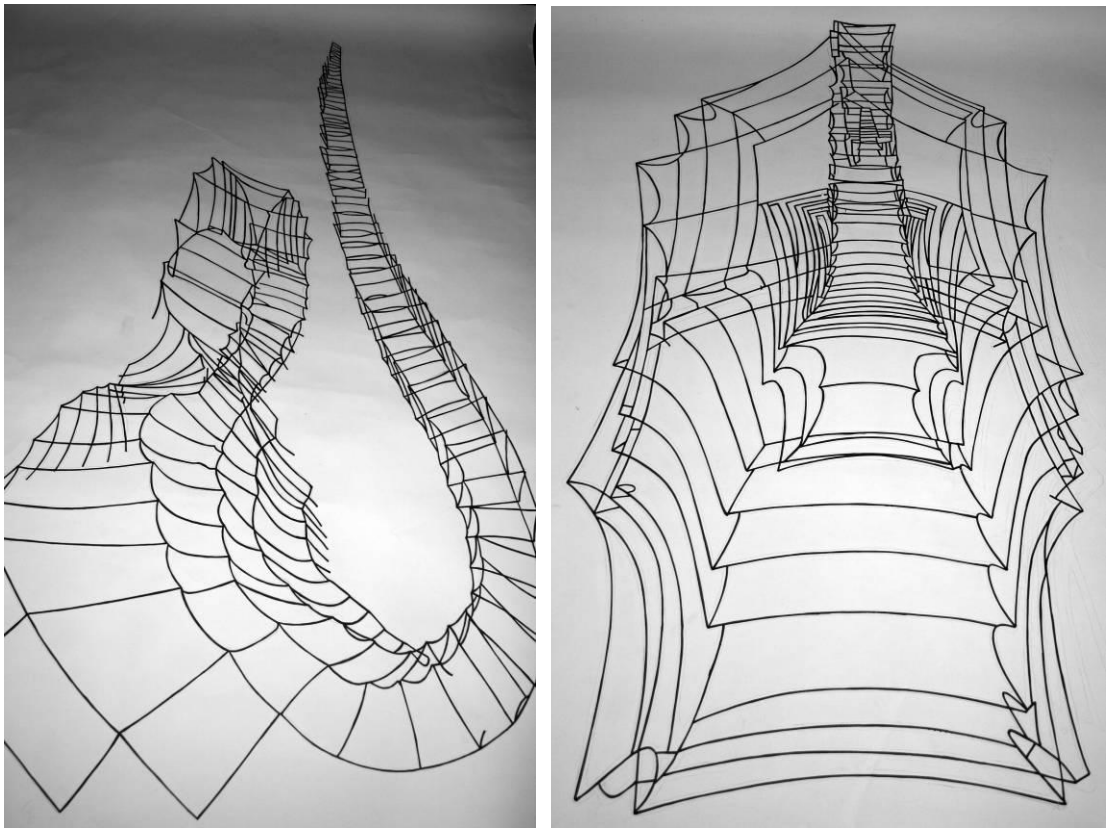


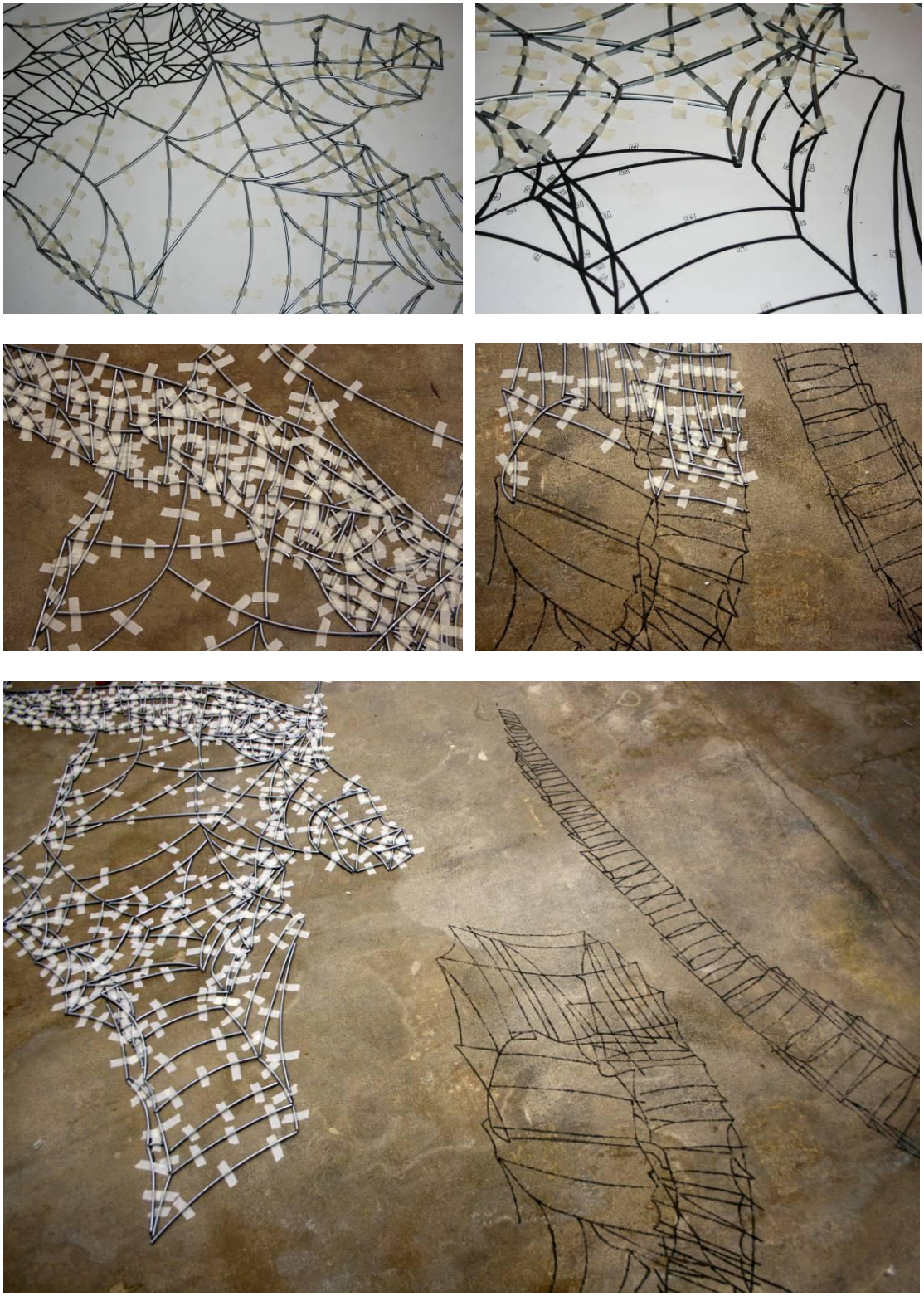
Figure 7.5. Interconnecting maze-like lines of shadow drawings.



Figures 7.6 – 7.9. Drawing into the maze with permanent marker to simplify the lines.



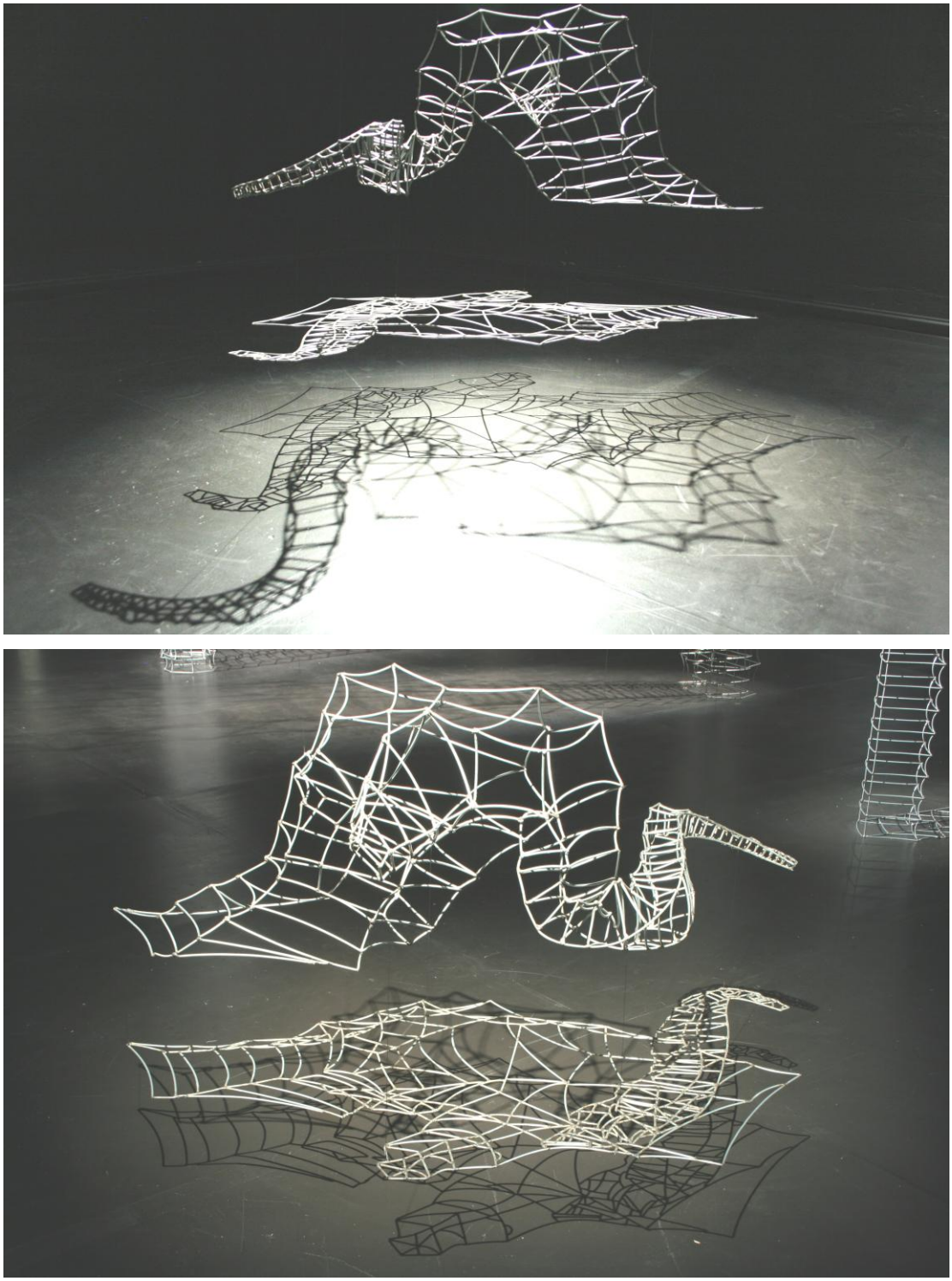
Figures 7.10 - 7.11. Completed shadow drawings ready to be translated into wire sculptures.



Figures 8.1 – 8.5. Cutting wire to replace the drawn lines of the shadows.

Figures 8.6 – 8.7. Welding the wire together.

The flat[9] shadow sculptures (*Hippocampus 7* & *8* 2009: Figs. 9.1 – 10.2) have similar visual properties to the flat seahorse skin.



Figures 9.1 – 9.2. Exhibition installation: Beth Armstrong, *Hippocampus 7 (*flat shadow sculpture*)* (2009), welded 4mm wire, 137 x 71 x 0.4 cm

[9] I call them flat sculptures as they exist on flat planes but are also sculptural in the sense that the medium, the wire, has volume.

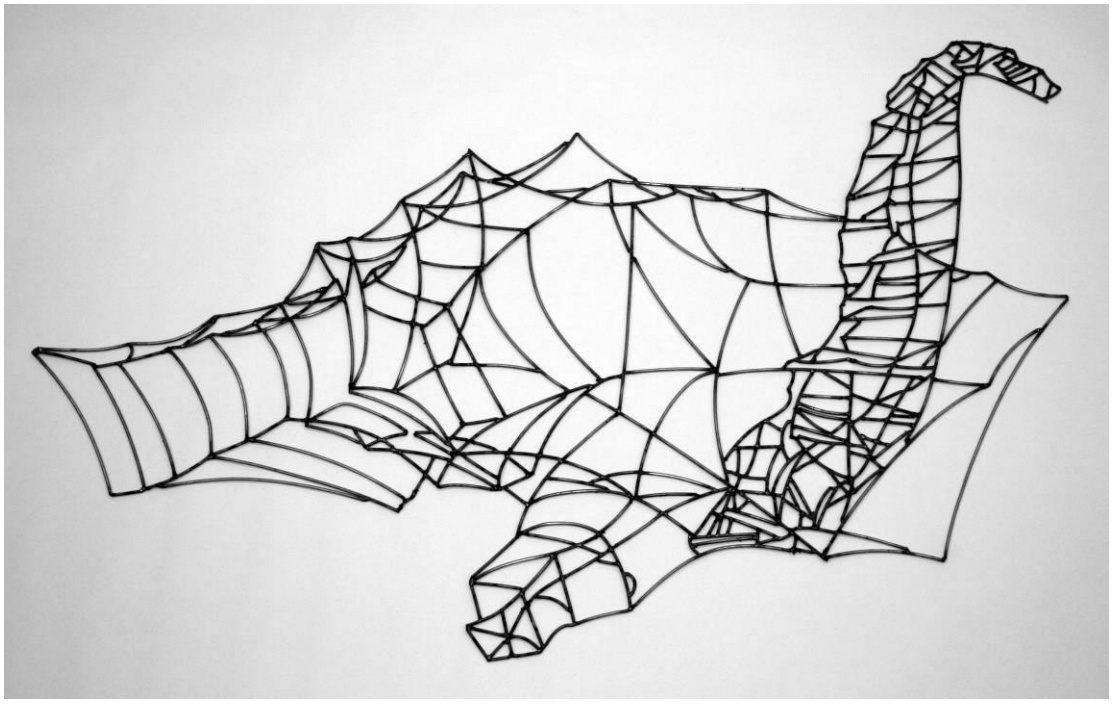


Figure 9.3. Work in progress: Beth Armstrong, *Hippocampus 7 (*flat shadow sculpture*)* (2009), welded 4mm wire, 137 x 71 x 0.4 cm

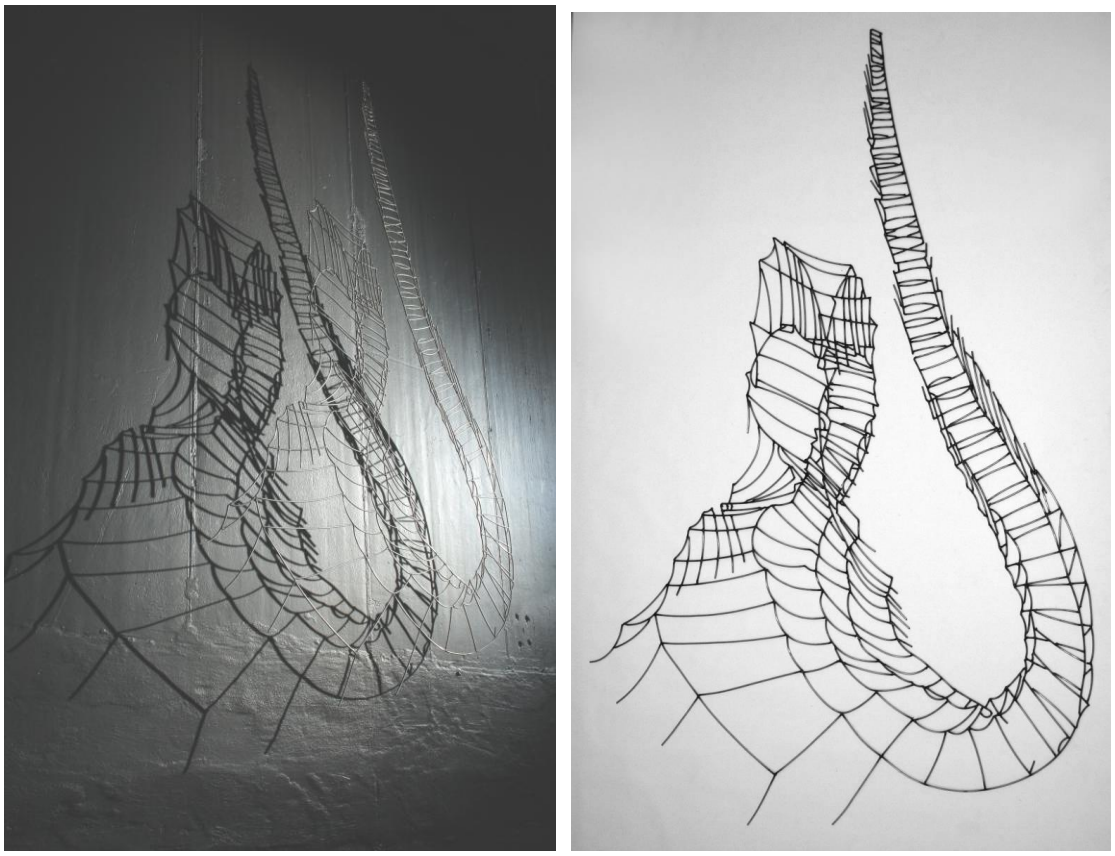
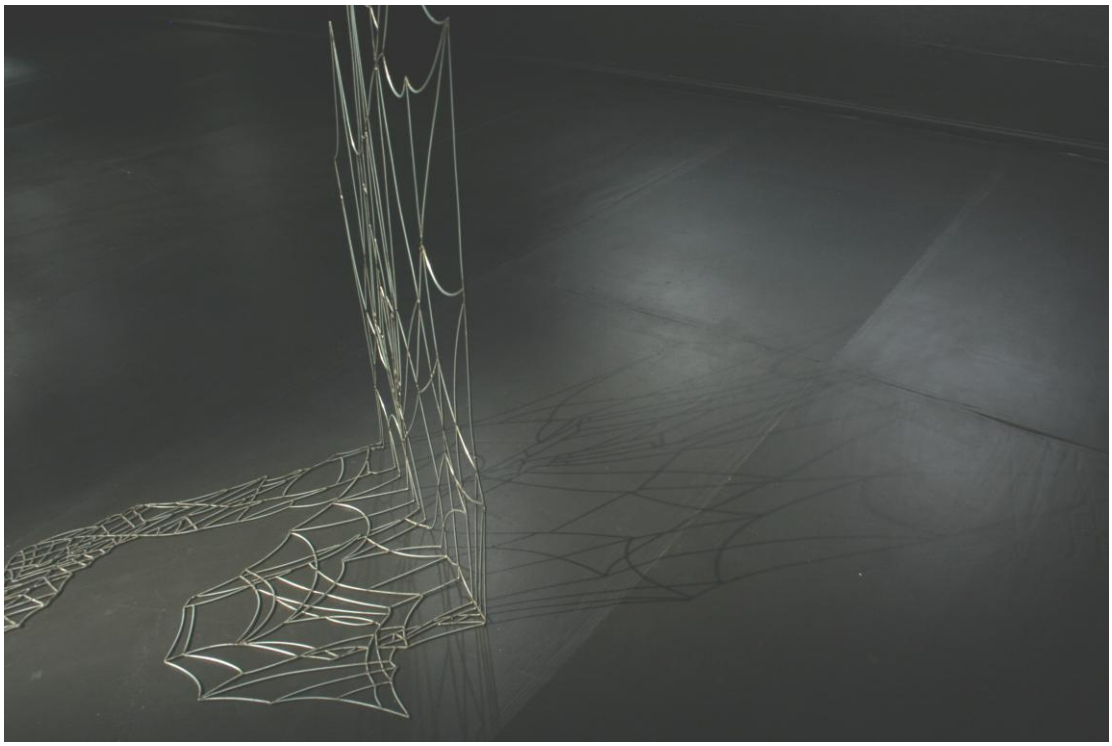
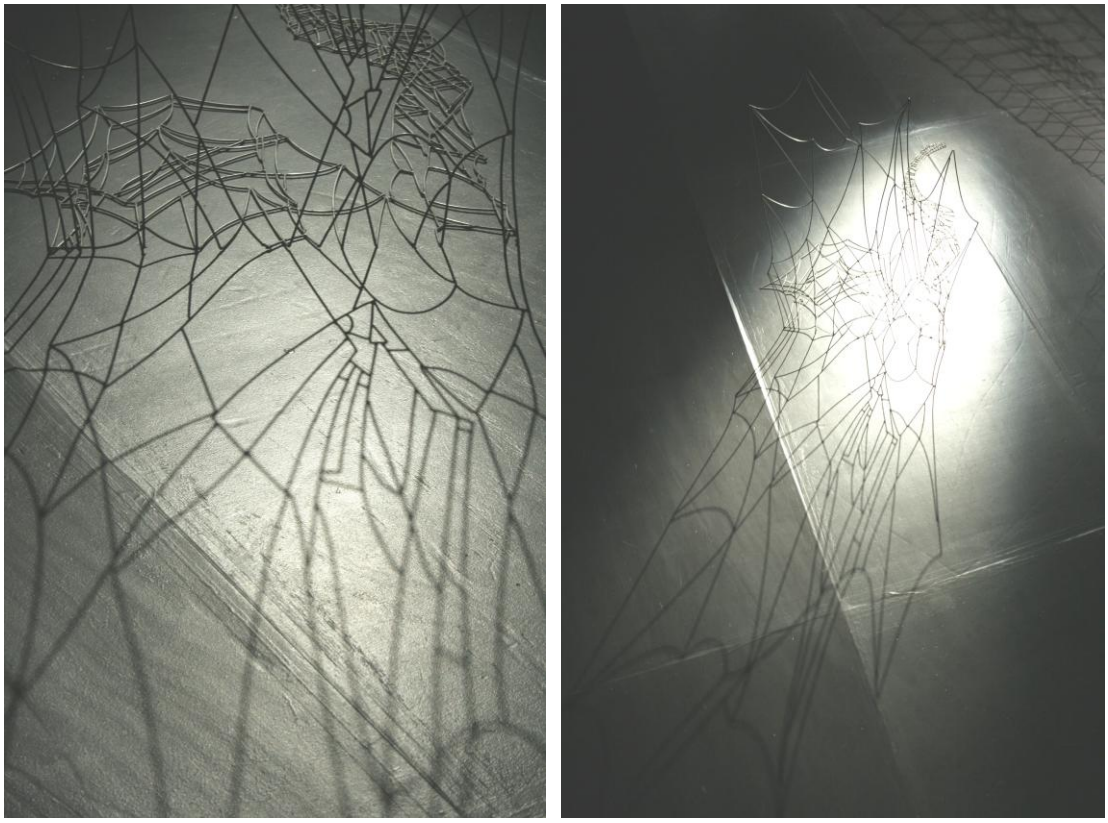


Figure 10.1 – 10.2. Exhibition installation and work in progress respectively: Beth Armstrong, *Hippocampus 8* (flat shadow sculpture) (2009), welded 4mm wire, 190 x 124 x 0.4 cm

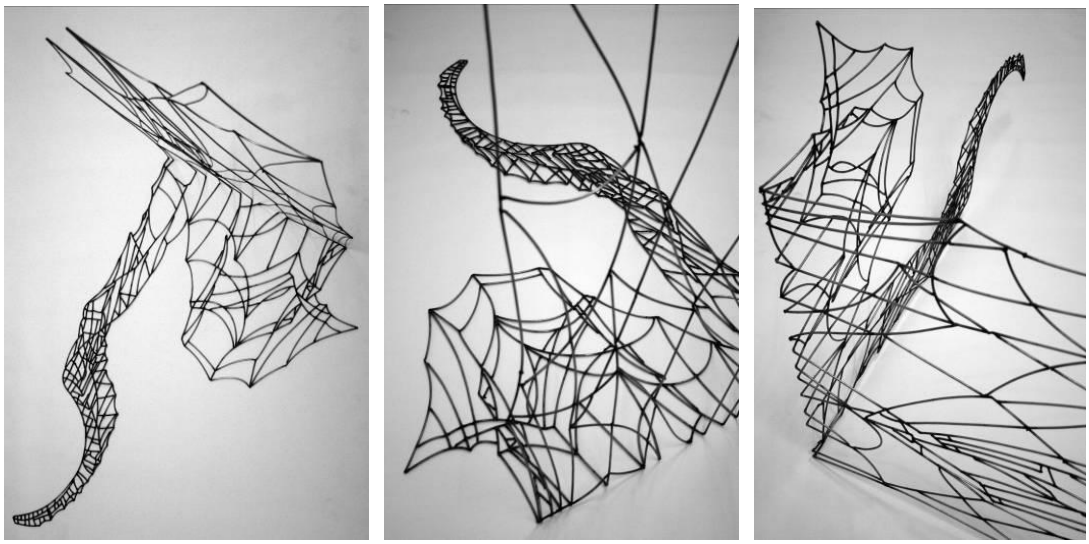
Sometimes the ‘flat sculptures’ appear to be three-dimensional, but they subsequently flatten out into two-dimensional ‘patterns’ that have no visual depth or volume. The process of drawing and redrawing the shadows had by chance broken down and deconstructed the lines; they are no longer continuously connected. The fluidity and congruence of the lines are disrupted so that the eye cannot sustain a perception of the image. The eye is pushed and pulled as it tries to make sense of the image, to understand it as a representation of an object, but is constantly oscillating between ‘pattern’ and ‘form’ and is ultimately denied the image it seeks.

Playing with this idea of a sculpture appearing to occupy more space than it actually does, I sculpted two of the flat shadow works so that they do not only lie on a flat plane, but ‘fold’ or ‘lift’ into three-dimensional space. In (*Hippocampus 9* 2010: Figs. 11.1 – 11.6) the sculpture is divided down the middle and both halves are welded perpendicular to one another, creating a ‘corner’ as though a shadow was cast up a wall. In (*Hippocampus 10* 2009: Figs. 12.1 – 12.2) the sculpture appears to be peeling off the flat plane, like paint lifting off a wall. In both these works, this break away from the plane into ‘space’ is very subtle.



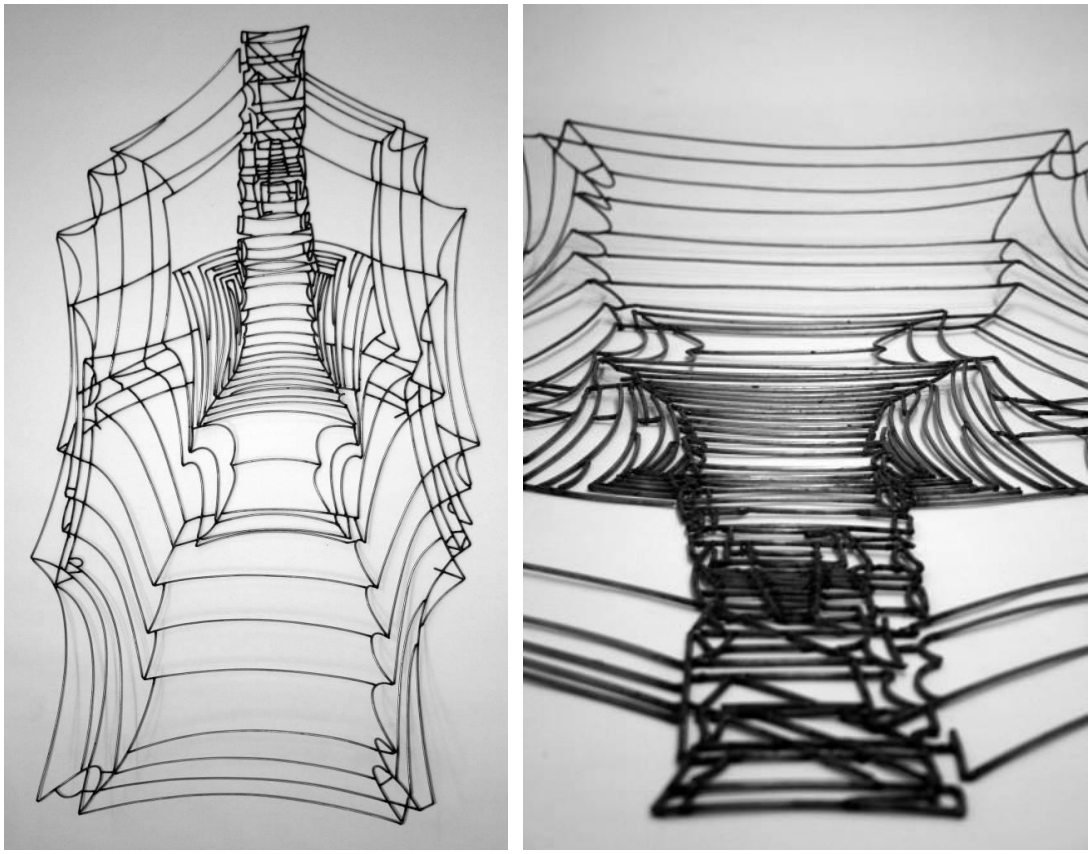


Figures 11.1 – 11.3. Exhibition installation: Beth Armstrong, *Hippocampus 9* (2010), welded 4mm wire, 143 x 132 x 195cm



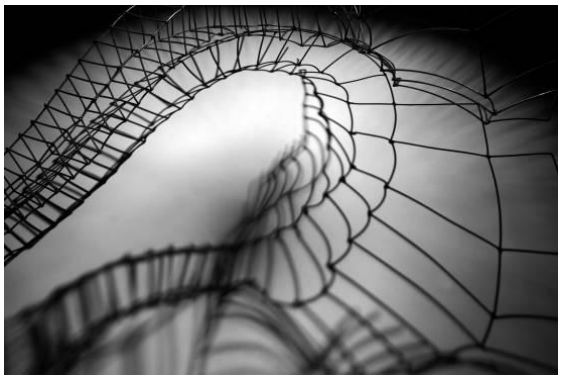
Figures 11.4 – 11.6. Work in progress: Beth Armstrong, *Hippocampus 9* (2010), welded 4mm wire, 143 x 132 x 195cm

Figure 12.1. Exhibition installation: Beth Armstrong, *Hippocampus 10* (2009), welded 4mm wire, 160 x 93 x 25 cm



Figures 12.2 – 12.3. Work in progress: Beth Armstrong, *Hippocampus 10* (2009), welded 4mm wire, 160 x 93 x 25 cm

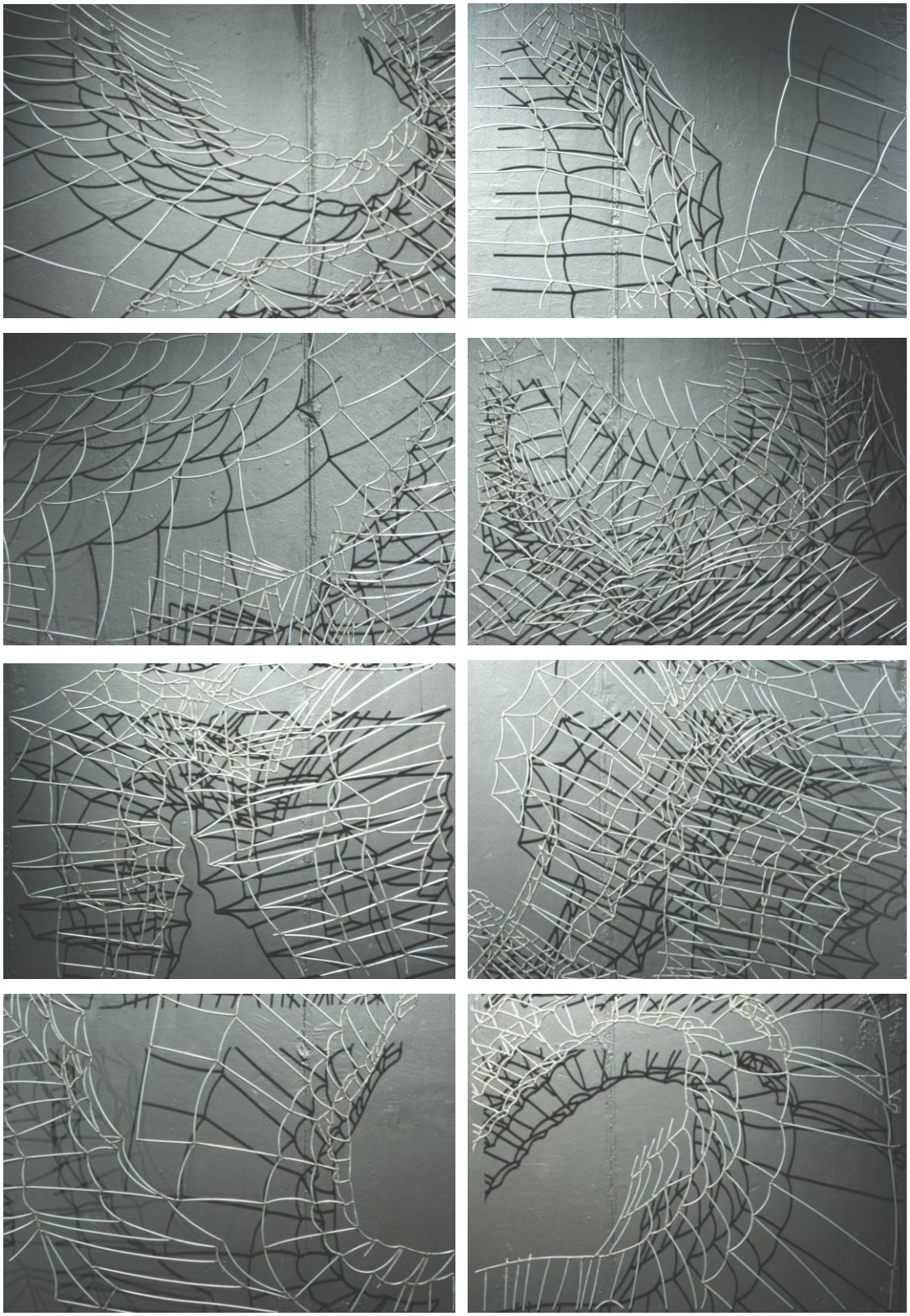
Following another path, I took photographs of the sculptures and their shadows (2009: Figs. 13.1 – 13.11). In these photographs, my interest was in the way the lines of the sculpture and those of the shadow bleed into one another and become indistinguishable. At times, the shadows appeared to have more of a density than the sculptures themselves and I found the relation between the two to be visually interesting.



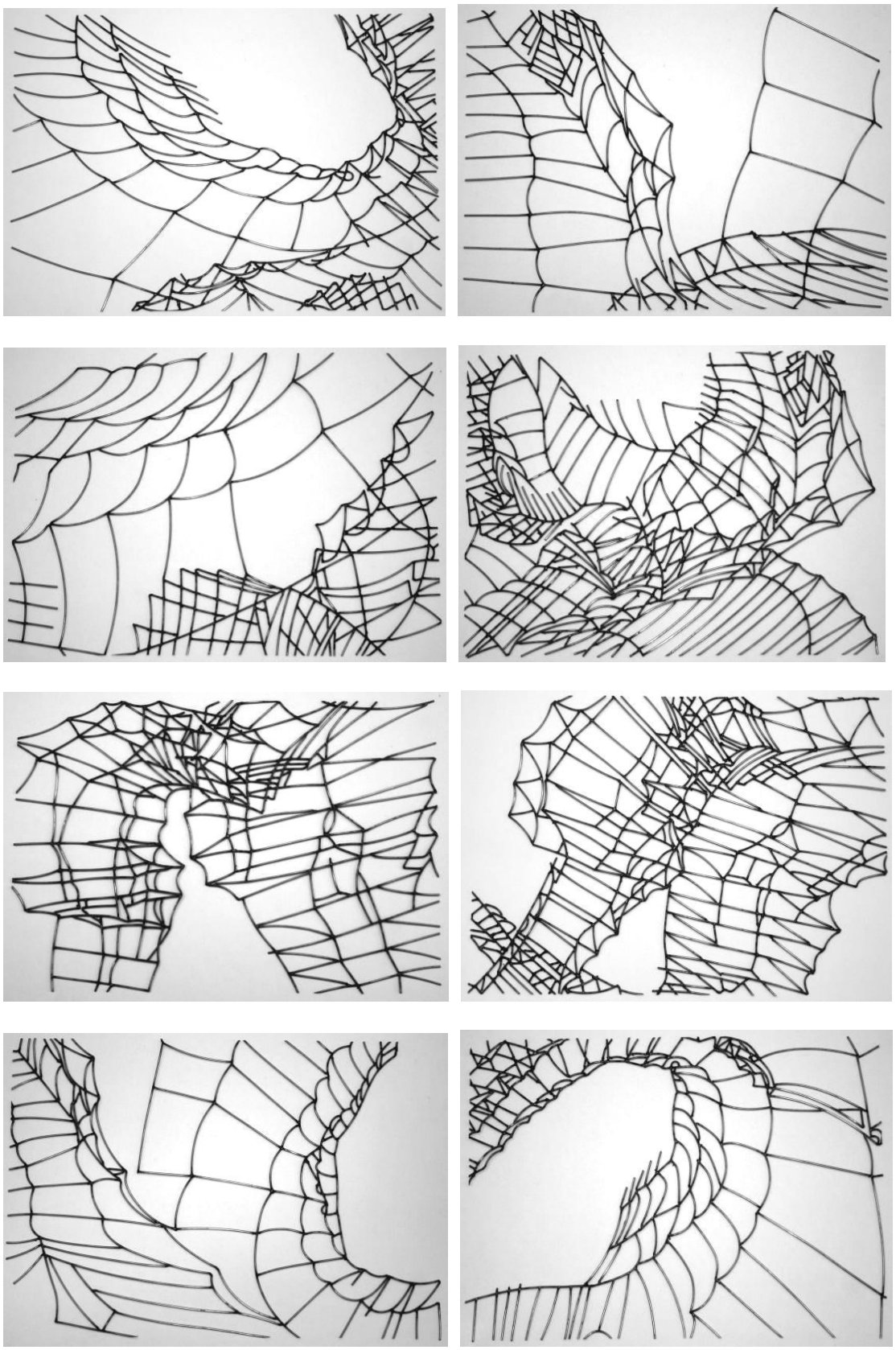



Figures 13.1 - 13.11. Beth Armstrong, *Untitled* (2009), photographs of sculptures and their shadows.

Reluctant to include photographs in my final exhibition, I translated these photographs into eight working images. I brought shadow and sculpture onto the same visual plane by replacing all the lines, whether shadow or sculpture, with wire and created flat sculptural works (*Hippocampus 11* 2010: Figs. 14.1 - 14.16).

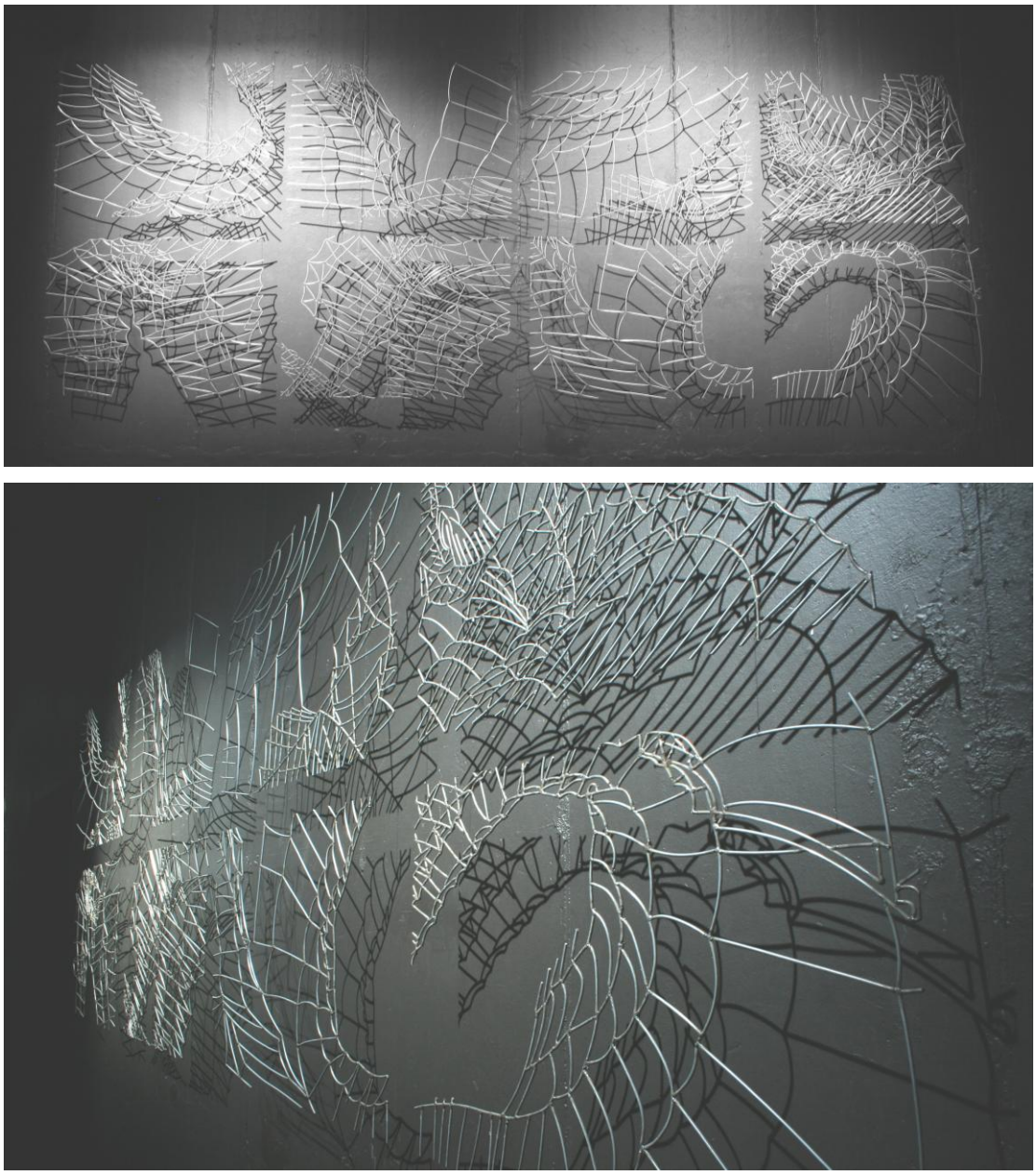


Figures 14.1 – 14.8. Exhibition installation: Beth Armstrong, *Hippocampus 11* (2010), welded 4mm wire, 85 x 60 x 0.4 cm each



Figures 14.9 – 14.16. Work in progress: Beth Armstrong, *Hippocampus 11* (2010), welded 4mm wire, 85 x 60 x 0.4 cm each

In these works, it is unclear which lines were initially shadow and which were sculpture. They are ‘framed’ by the rectangular shape of the abrupt wire-ends; making each image concurrently contained and limitless. They are displayed as a grid (*Hippocampus 11* 2010 Fig. 14.17 – 14.19) consisting of two rows of four rectangles such that they appear to match up with one another but also, evidently, do not. The eye moves from image to image, continually trying to match up the pieces. The mind moves them about looking for solutions.



Figures 14.17 – 14.18. Exhibition installation: Beth Armstrong, *Hippocampus 11* (2010), welded 4mm wire, 85 x 60 x 0.4 cm each.

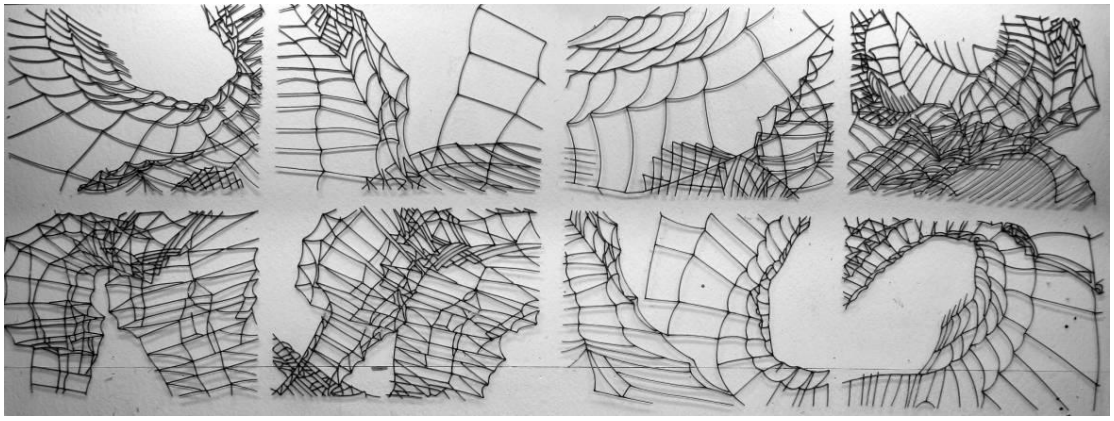
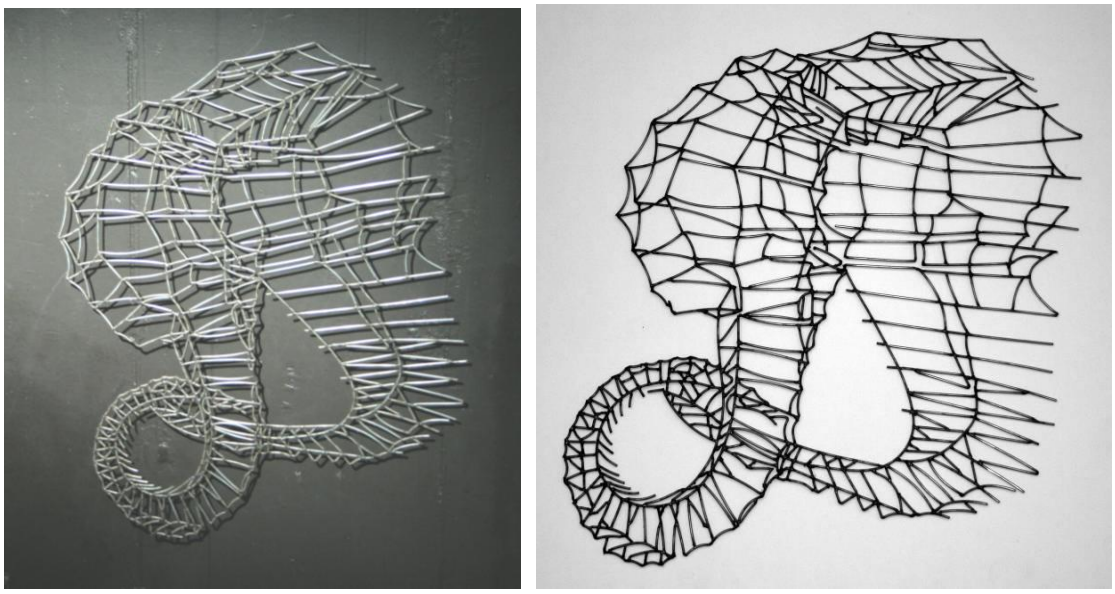


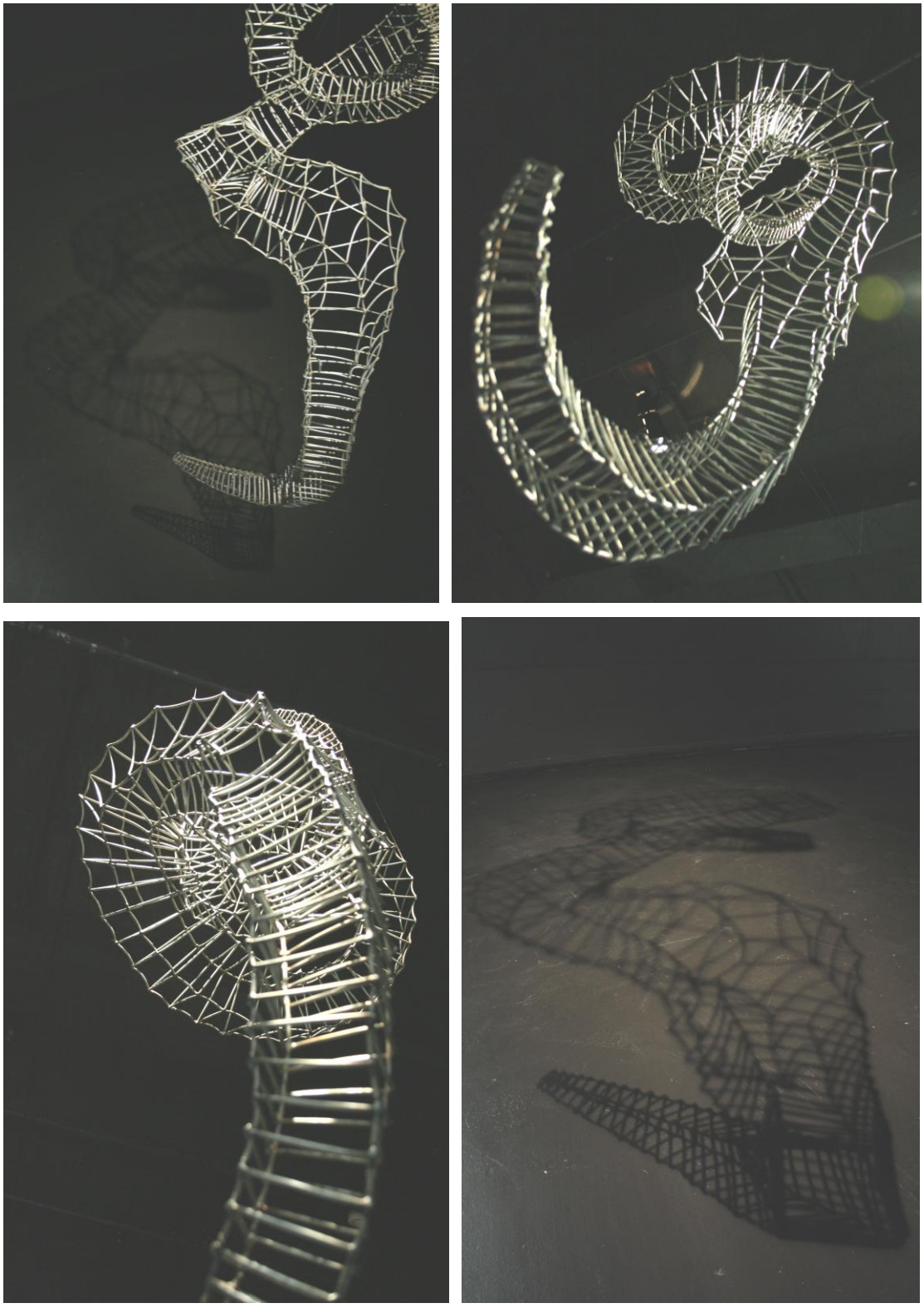
Figure 14.19. Work in progress: Studio shot of ‘framed’ wire sculptures in a grid.

Through a similar process to the rectangles above, I sculpted a complete (not fragmented, like the rectangles) photographic image of the small seahorse and its shadow (*Hippocampus 11b* 2009: Fig. 15.1 – 15.2).

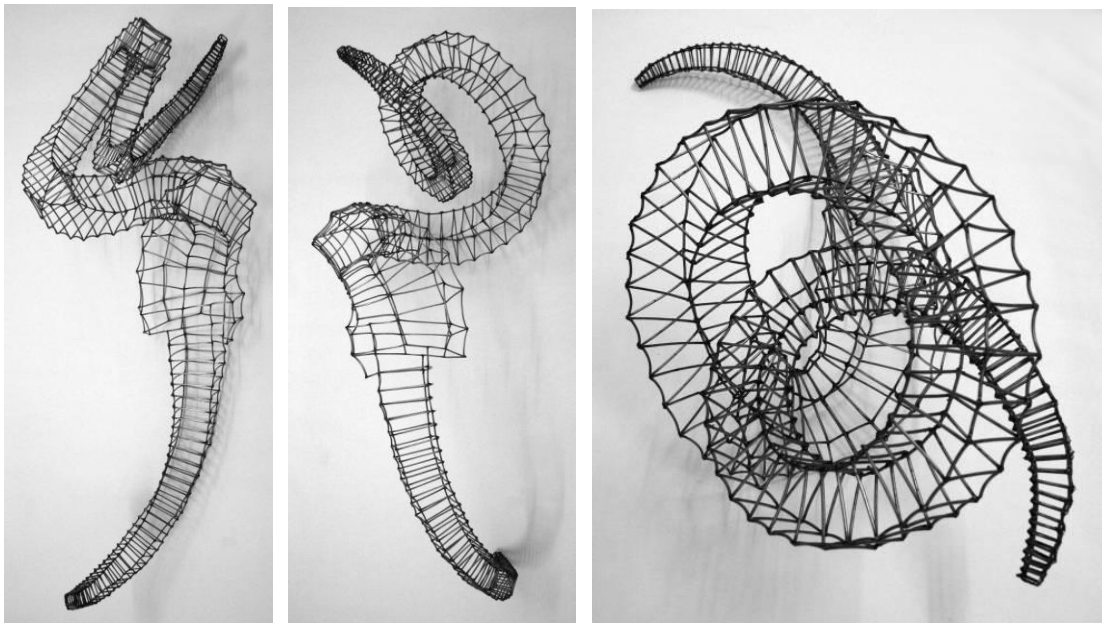


Figures 15.1 – 15.2. Exhibition installation and work in progress respectively: Beth Armstrong, *Hippocampus 11b* (2009), welded 4mm wire, 106 x 88 x 0.4 cm

This flat work was the inspiration for another three-dimensional sculpture (*Hippocampus 12* 2010: Figs. 16.1 – 16.7) in which a seahorse is attached at the head to another seahorse’s tail. There is merging of two seahorses, playing on the idea of a conjoined double, an inescapable attachment, a pairing.



Figures 16.1 – 16.4. Exhibition installation: Beth Armstrong, *Hippocampus 12* (2010), welded 4mm wire, 170 x 75 x 55 cm

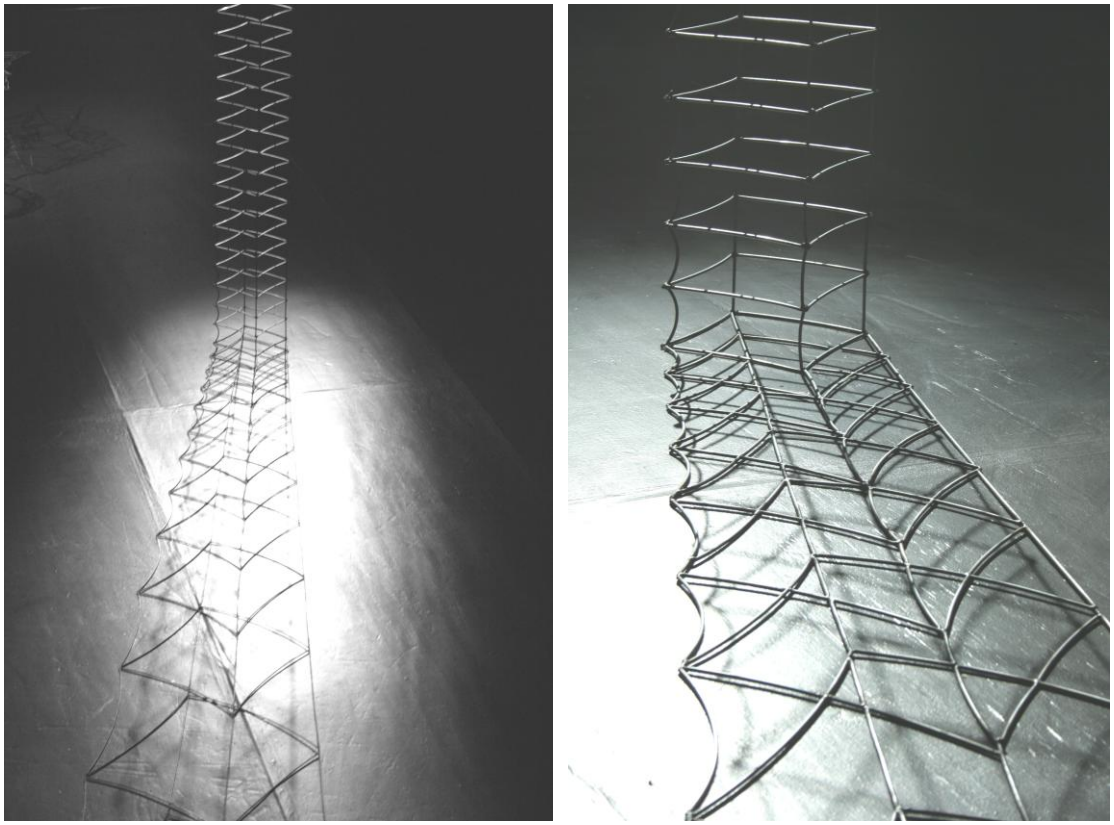


Figures 16.5 – 16.7. Work in progress: Beth Armstrong, *Hippocampus 12* (2010), welded 4mm wire, 170 x 75 x 55 cm

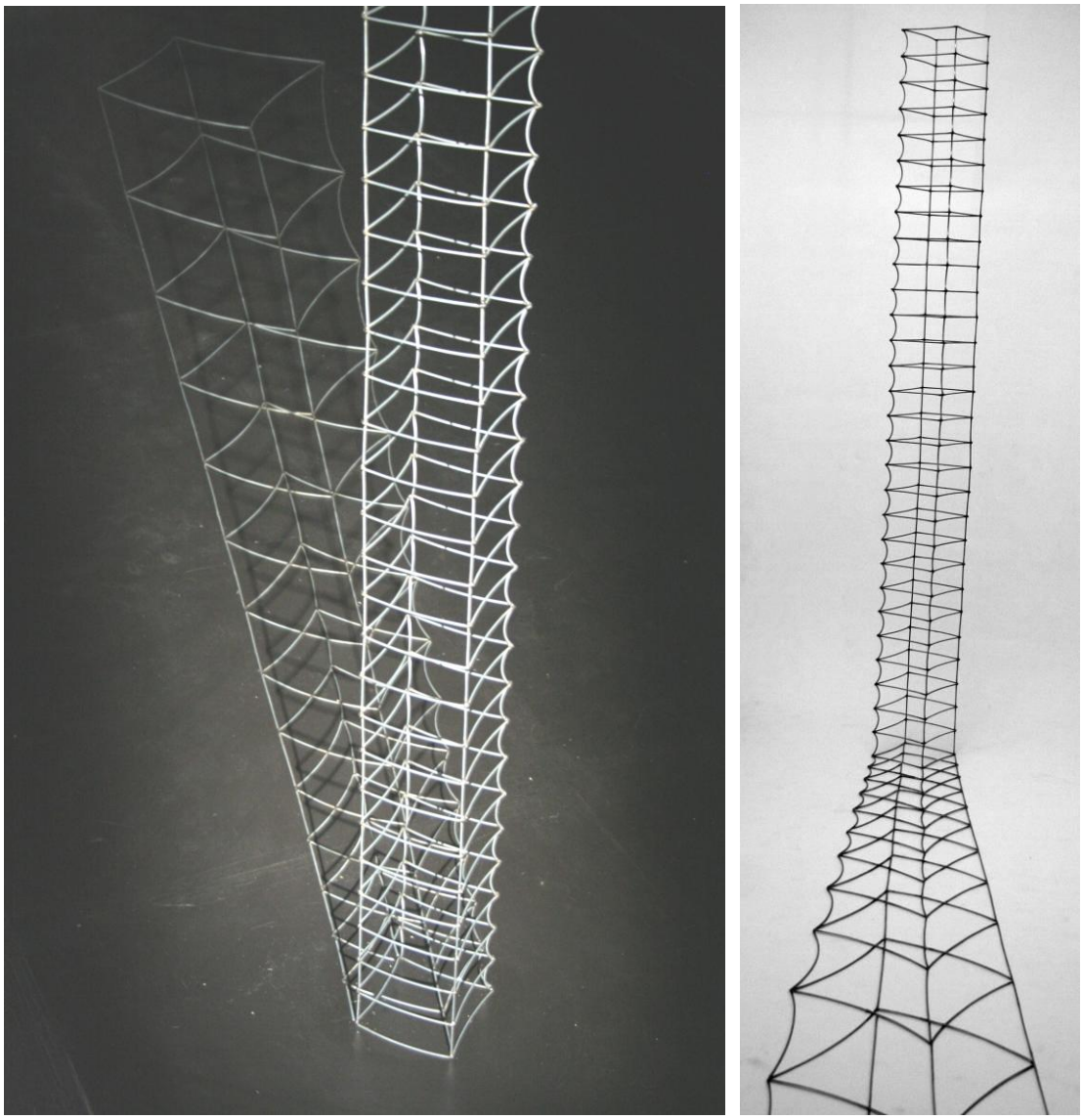
An Attention to Structure

From very early on in the development of '*Hippocampus*', I felt compelled to make five pillar structures from five different segment shapes of the first seahorse. In my mind's eye these straight, uniform structures would stand in stark contrast to some of the other more gestural works. They progressed slowly and were the last to be assembled. By the time I sculpted them I was interested in working with the idea of a doubling, spoken of above, and so the pillars come in pairs, each one interacting or interconnecting with another.

In (*Hippocampus 13* 2010: Figs. 17.1 – 17.3), a square 'tail-piece' pillar casts a long shadow across the floor, which is then sculptured as a flat shadow sculpture. The pillar is paired with a flat representation of itself – the inescapable shadow.

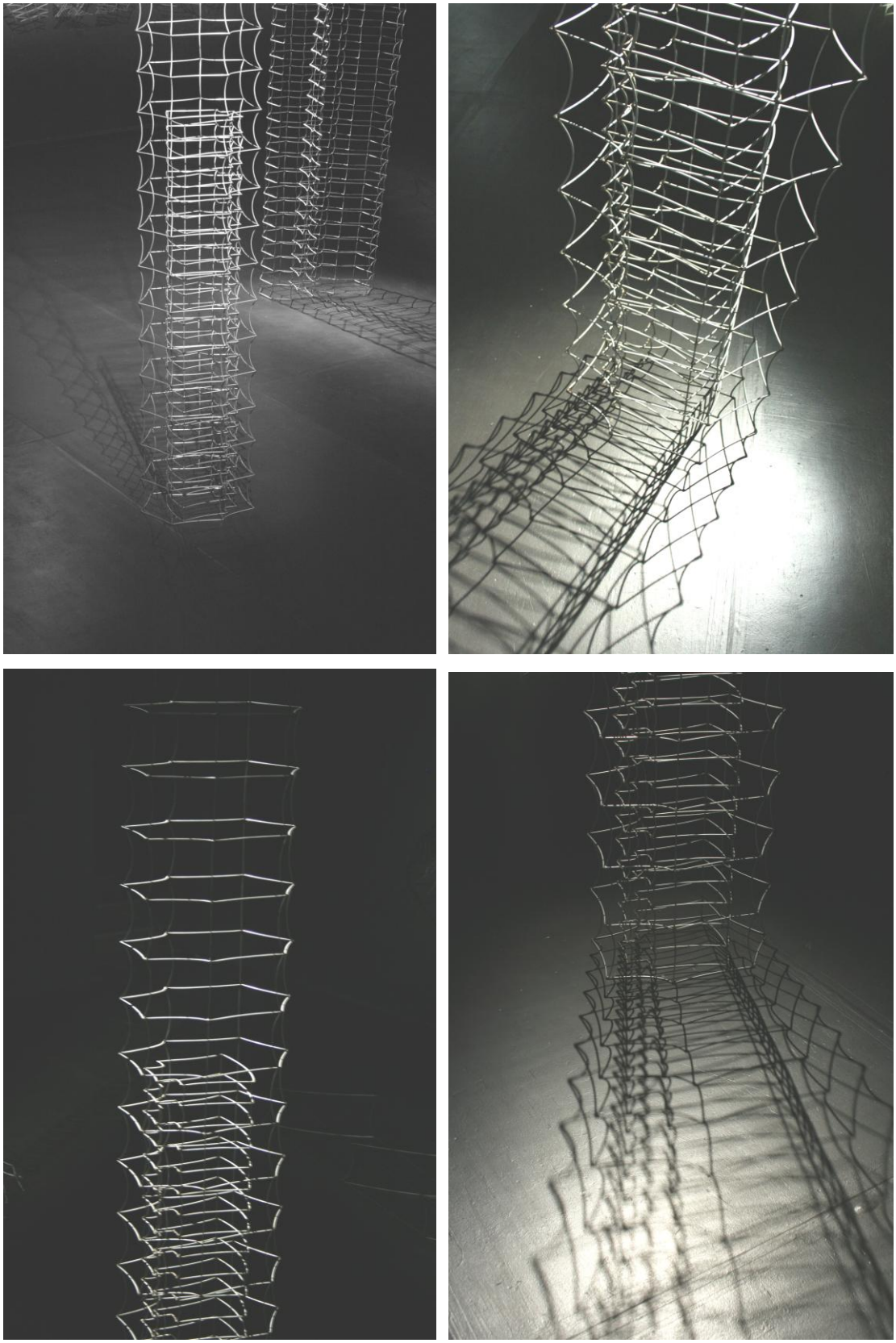


Figures 17.1 – 17.2. Exhibition installation: Beth Armstrong, *Hippocampus 13* (2010), welded 4mm wire, 227 x 20 x 20 cm (pillar), 537 x 90 x 0.4 cm (shadow of pillar).

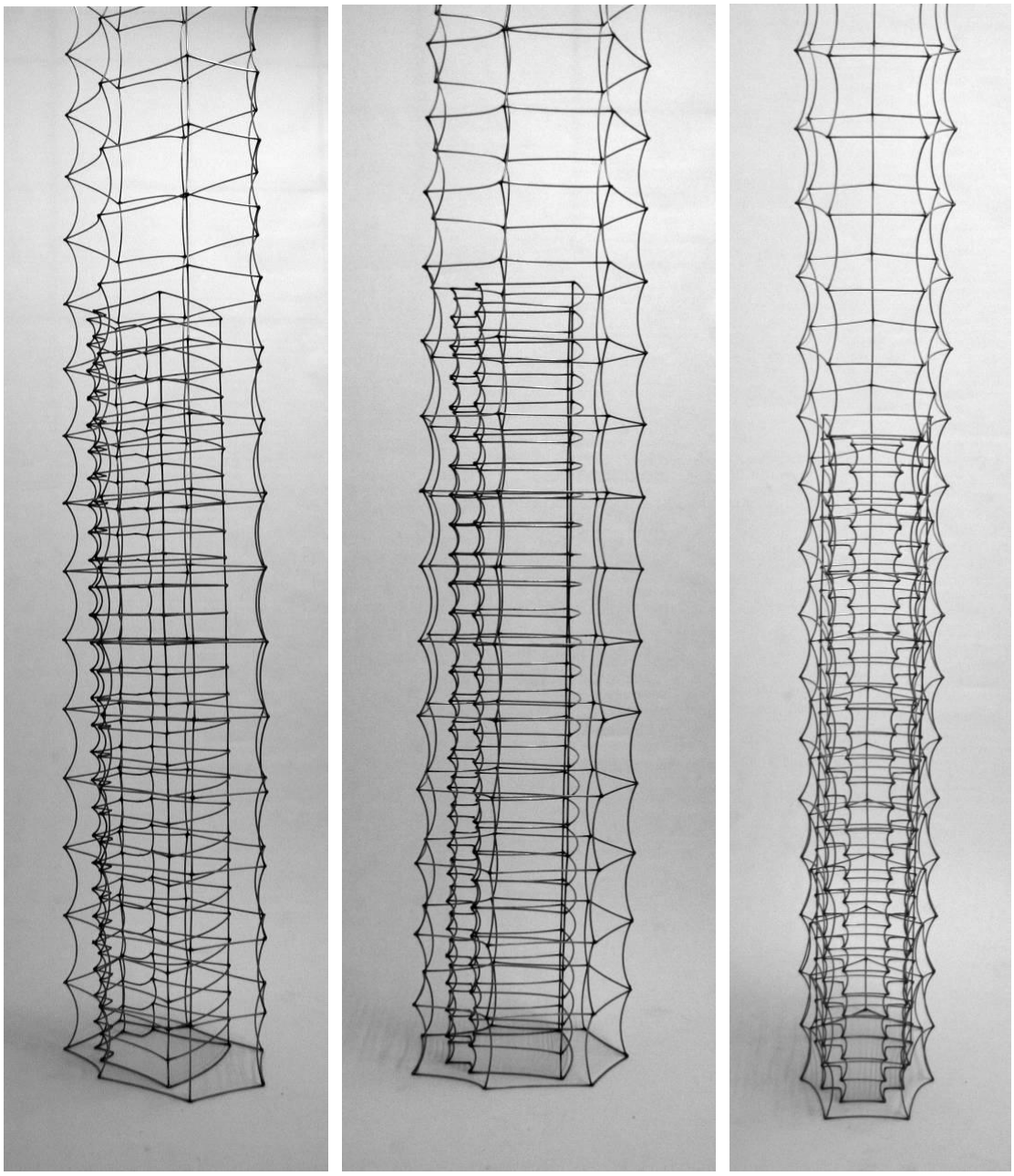


Figures 17.3 – 17.4. Exhibition installation and work in progress respectively: Beth Armstrong, *Hippocampus 13* (2010), welded 4mm wire, 227 x 20 x 20 cm (pillar), 537 x 90 x 0.4 cm (shadow of pillar).

In (*Hippocampus 14* 2010: Figs 18.1 – 18.7), the largest 'torso-piece' segment of the original seahorse is sculpted 3 meters tall with big lofty spaces between each segment. Inside this pillar is another smaller, more compact pillar that reaches just over half the height of the tall one. Two relatively simple structures overlap and create a much more chaotic structure; uniform, geometric and complex.

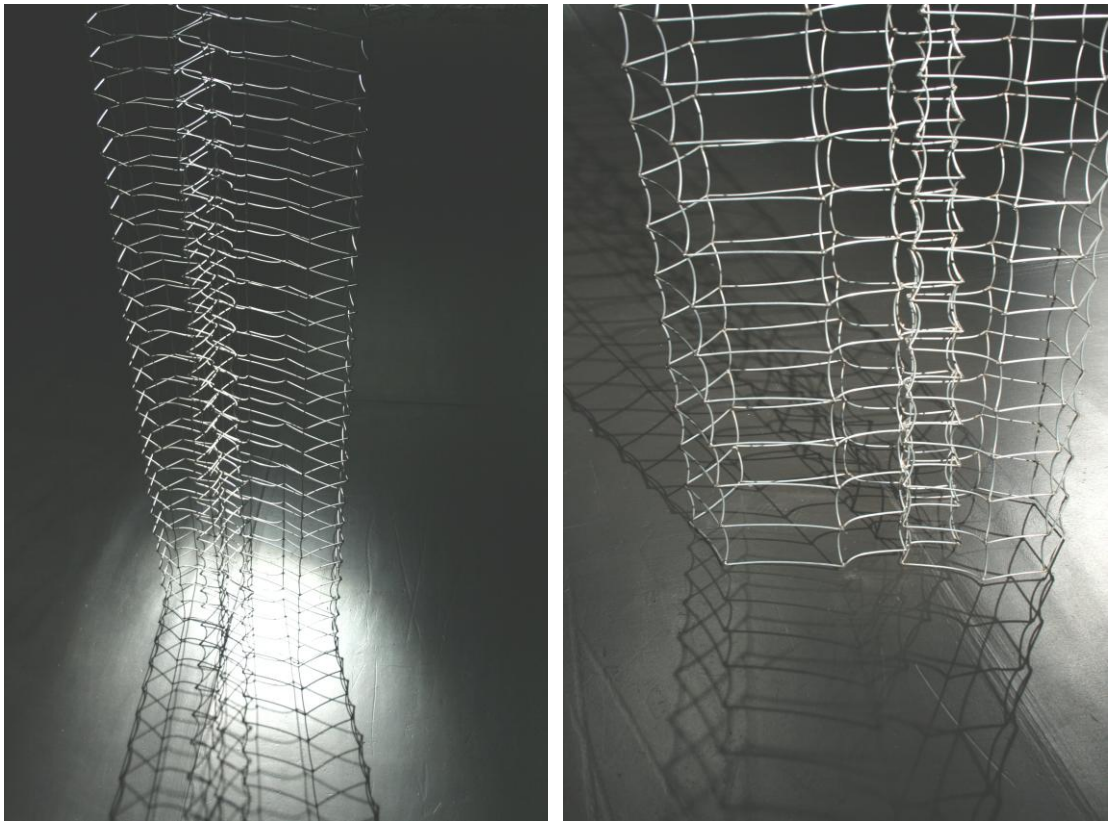


Figures 18.1 – 18.4. Exhibition installation: Beth Armstrong, *Hippocampus 14* (2010), welded 4mm wire, 175 x 30 x 27 cm (inside pillar), 307 x 50 x 35 cm (outside pillar)

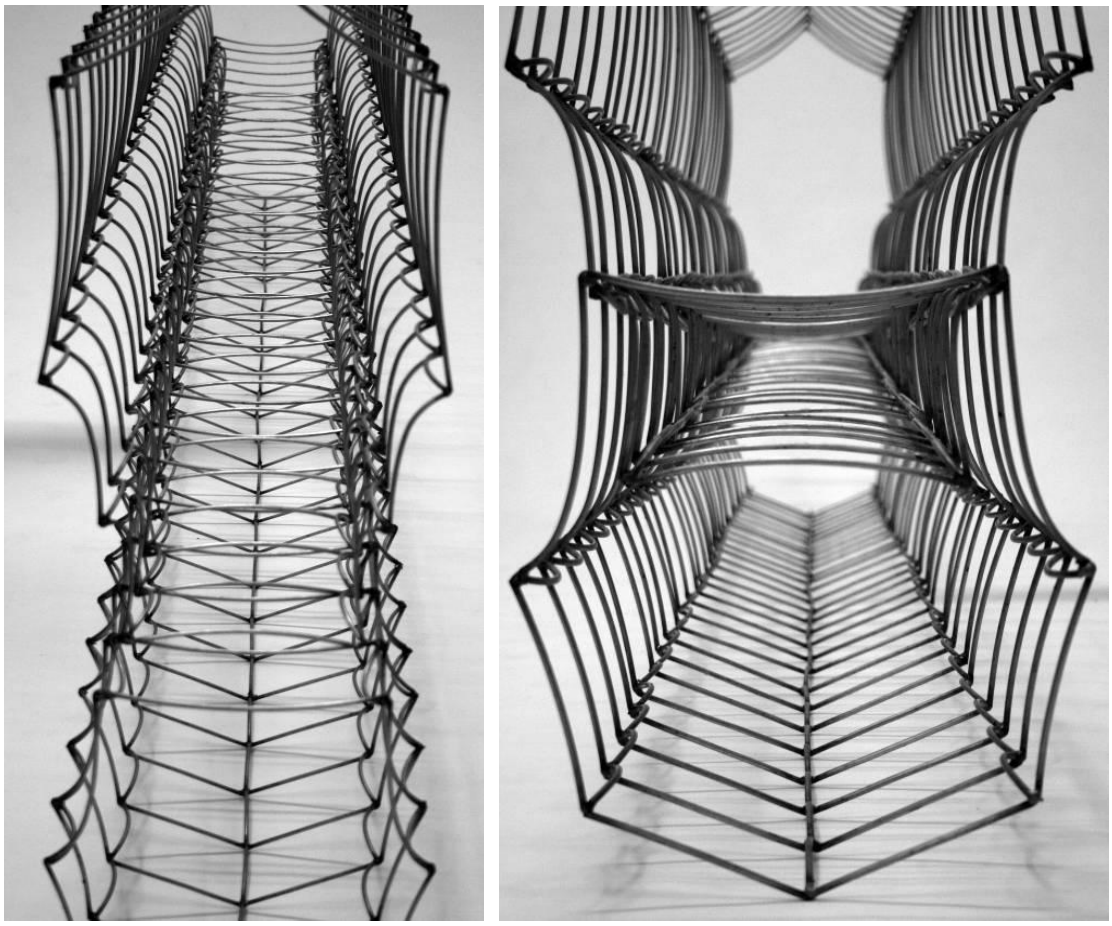


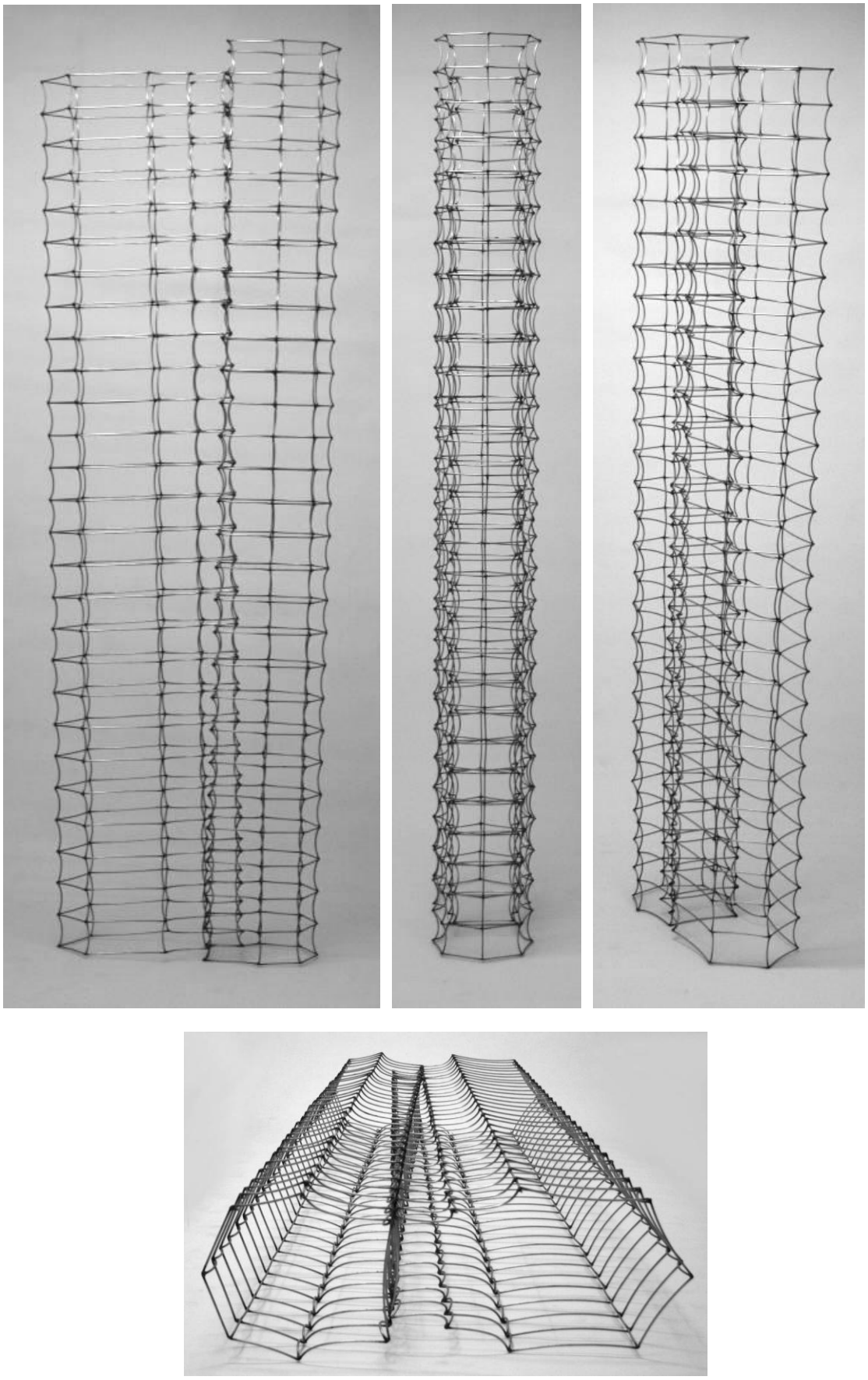
Figures 18.5 – 18.7. Work in progress: Beth Armstrong, *Hippocampus 14* (2010), welded 4mm wire, 175 x 30 x 27 cm (inside pillar), 307 x 50 x 35 cm (outside pillar)

In the last of the pillar works (*Hippocampus 15* 2010: Figs. 19.1 – 19.6) two 'torso-piece' segments interconnect and interlock such that they can never be separated. The one pillar peels away slightly from the other. This leaves a rather precarious relation between the two.



Figures 19.1 – 19.2. Exhibition installation: Beth Armstrong, *Hippocampus 15* (2010), welded 4mm wire, 256 x 85 x 30 cm





Figures 19.3 – 19.8. Work in progress: Beth Armstrong, *Hippocampus 15* (2010), welded 4mm wire, 256 x 85 x 30 cm

CHAPTER TWO

HIPPOCAMPUS

Discovering the Hippocampus

Discovering by chance the link between the seahorse and the hippocampus of the brain was fortunate for a number of reasons. The sculptures were beginning to conflate the perceptual boundaries between two- and three-dimensional spaces, the space that they occupied becoming increasingly indefinable. Consequently, the hippocampus' role in cognitive mapping of *space* is significant. Cognition is the act or process of knowing: perception[10]. A cognitive map suggests a mental process that charts perception, in this case, the perception of space.

The hippocampus also resonated with me on a more personal level. A few months before the seahorse appeared in my bed, I developed a health condition, of which the most unsettling symptom was vertigo[11]. The spatial world as I had always known it – stable, mappable and relatively predictable – had changed. Constantly shifting, spinning, sinking, and pulling, I felt fragmented and dissociated as my brain tried to interpret and process the conflicting messages it was receiving about my physical orientation. I consider it beautifully coincidental that, firstly, the hippocampus is situated very close to the inner ear (from where the vertigo originates) and, secondly, that its role is providing an individual with a sense of spatial orientation. Although my health condition has nothing physically to do with the hippocampus it is interesting that a malfunctioning (usually shrinking) hippocampus results in

[10] 'cognition *noun*' *The Oxford Dictionary of English* (revised edition). Ed. Catherine Soanes and Angus Stevenson. Oxford University Press, 2005. *Oxford Reference Online.* Oxford University Press. Rhodes University Library. 12 February 2010 http://www.oxfordreference.com/views/ENTRY.html?subview=Main&entry=t140.e14958

[11] 'Vertigo n. a disabling sensation in which the affected individual feels that either himself or his surroundings are in a state of constant movement. It is most often a spinning sensation but there may be a feeling that the ground is tilting. It is a symptom of disease either in the labyrinth of the inner ear or in the vestibular nerve or its nuclei in the brainstem, which are involved in the sense of balance.' From: *Concise Medical Dictionary.* Oxford University Press, 2007. *Oxford Reference Online.* Oxford University Press. Rhodes University Library. 12 February 2010 http://www.oxfordreference.com/views/ENTRY.html?subview=Main&entry=t60.e10731

conditions such as Alzheimer's disease, bipolar, Schizophrenia and severe depression; all being illnesses accompanied by varying degrees of disorientation and dissociation.

Although there is continual research going into understanding the exact and multifunctional roles that the hippocampus plays in brain functioning[12], in this thesis I will only be focusing on this one particular function. After looking briefly at the physical and operative properties of the hippocampal cognitive map, I will propose a different, more fluid way of thinking about the mapping of both conceptual and physical space. Where the terms hippocampus (brain structure), *Hippocampus* (scientific name for seahorse) and seahorse (sea animal) become interchangeable, self-similar, a doubling – where a seahorse could be no more or less than a mapping of space, and the space being mapped no more or less than a seahorse.

John O'Keefe and Lynn Nadel, who were influenced by Edward Chace Tolman's theories of 'cognitive maps' in humans and animals, originally developed the theory of the hippocampus as a cognitive map. Although Tolman himself never imagined the cognitive map would be anything other than a metaphor accounting for spatial behaviour (spatial navigation) (O'Keefe & Nadel 1978: 51), O'Keefe and Nadel purport that it does actually exist in the brain, in the hippocampus, as a physical structure. Many findings have shown that there are neural cells (cells that are part of the nervous system) within the hippocampus that show responses related to a subject's location within its environment (Beaumont 1996: 397). O'Keefe and Nadel suggest that spatial information is encoded within the cellular activity of these neurons, calling them 'place cells' – physical/cellular elements of a cognitive map, a representation of the layout of the environment (Wood et al 1999: 211).

[12] There is another important function of the hippocampus that I will not be exploring in this thesis although it is functionally related to the cognitive map. The hippocampus is involved in memory, in learning about new events and facts. It plays an important role in integrating or binding together different aspects of a memory at the time of recollection and is believed to be responsible for locating the memory of an event in time, place and context. There seems to be a strong link between the hippocampus and the ability to construct and retain a narrative, a life-story and understanding of events in time (Beaumont 1996: 395). 'There are left-right differences in the function of the hippocampus in humans. Left temporal lobe and hippocampal damage tends to impair verbal memory tasks, such as word-paired associate learning…while damage to the right temporal lobe impairs conditional spatial response learning' (Beaumont 1996: 395 – 396). Beaumont explains the relationship between memory and spatial functions in the following way: 'One way of relating the impairment of spatial processing to other aspects of hippocampal function is to note that this spatial processing involves a snapshot type of memory, in which one whole scene must be remembered' (Beaumont 1996: 396).

Based on numerous scientific experiments with rats and humans, O'Keefe and Nadel's research implies that the cognitive map provides an *objective* spatial framework within which an organism can orientate and navigate itself (O'Keefe & Nadel 1978: 1). An organism's subjective experience of its physical and psychological location in space is separate from this mapping system. In other words, at the root of any personal experience of space, the brain perceives and retains spatial information within an innate/neutral/detached system that mediates one's perception of space.

O'Keefe and Nadel's specificity of this objective framework (map) goes even further. According to their studies, the map is characterised by a preconfigured network of connections between the 'place cells' that adheres to an abstract co-ordinate grid system (Wood et al 1999: 24). Spatial information is stored within a cohesive Cartesian grid of interconnecting parallel lines (two-dimensional), representing the relative angles and distances between objects. Strangely, while asserting that the cognitive map exists as a *physical* structure in the hippocampus, O'Keefe and Nadel (1978: 78) also insist that:

> the cognitive map is not a picture or image which 'looks like' what it represents; rather it is an information structure from which map-like images can be constructed and from which behaviour dependent upon place information can be generated.

This explanation seems more congruent with newer theories, which suggest that spatial representation is less than a 'map', *per se*, and that these representations (within place cells) are not cohesive or bound to a metric grid of angles and distances (Wood et al 1999: 220). Rather, the spatial representations are reflections of relational and inferential memory expressions, which are fragmentary and non-cohesive, but through which navigation is conducted. These memory codings are crucial to learning and remembering relationships that characterise spatial layouts, items in the particular context in which they have been experienced and other associative, sequential or logical relationships amongst experiences (O'Keefe & Nadel 1978: 2).

From Hippocampus to Rhizome – brain structure to plant structure – *Map* to *Concept Tool*

Deleuze's concept of the rhizome is also a mapping system, but of a different nature altogether than the kind proposed by O'Keefe and Nadel. Deleuze looks at the functional aspects of the structure of a botanical rhizome[13], and uses this to develop a 'productive fiction' (O'Sullivan 2007: 28), a 'concept tool' (O'Sullivan 2007: 16) or 'image of thought' with which to expand on more conceptual ideas about structures within life, art and politics.

O'Keefe and Nadel speak of the cognitive map in a rather literal sense, firstly as existing in the brain as a physical structure and, secondly, adhering to a two-dimensional, metrical grid-like structure. One cannot help, then, imagining something similar to a conventional geographic map, a road map, perhaps. These maps are representations of a set of connected places, which correspond to the relative distances, angles, dimensions and sizes of the physical environment, using representational conventions of symbols and codes. However, seeming to contradict themselves, O'Keefe and Nadel also explain that the cognitive map carries more the *function* of a map than the *image* of one. This is similar to Deleuze's notion of a rhizome 'map' in that he places more importance on *how* it operates than *what* it represents. The rhizome is an anti-system, against representation.

The function of a conventional map is evident through looking at how we *read/interact* with them. In a road map, any number of paths can guide one to a desired destination. Maps, on a conceptual level, are flexible, making connections and relations between almost anything; the traveler can choose and plot her own path and change course at any time. These maps have high information contents resistant to degradation, for the loss of some information does not render one helpless. Maps are built out of curiosity and experimentation. No object or place on a map is specifically or implicitly a goal (O'Keefe & Nadel 1978: 86).

[13] The rhizome is 'a continuously growing horizontal underground stem which puts out lateral shoots and adventitious roots at intervals'.
From: 'rhizome *noun' The Oxford Dictionary of English* (revised edition). Ed. Catherine Soanes and Angus Stevenson. Oxford University Press, 2005. *Oxford Reference Online.* Oxford University Press. Rhodes University Library. 12 February 2010
http://www.oxfordreference.com/views/ENTRY.html?subview=Main&entry=t140.e65965

Deleuze asserts that an important characteristic of the rhizome is its principle of connection and heterogeneity: 'any point of a rhizome can be connected to anything other, and must be. This is very different from the tree or root which plots a point, fixes an order' (Deleuze & Guattari 2004: 8-9). This reference to the structure of a tree is a comparative device that Deleuze uses to explain the structure (or, rather, anti-structure) of the rhizome: 'unlike the tree, the rhizome is not the object of reproduction: neither external reproduction as image-tree or internal reproduction as tree-structure. The rhizome is antigenealogy' (Deleuze & Guattari 2004: 23).

Unlike the tree, the rhizome does not have an axis or deep structure: a 'pivotal unity upon which successive stages are organised' (Deleuze & Guattari 2004: 13). Such systems are hierarchical with centralized organizing structures (such as a tree trunk) and divergent sub-structures (such as branches – twigs – leaves).

The rhizome is a 'concept that "maps" a process of networked, relational and transversal thought, and a way of being without "tracing" the construction of that map as a fixed entity' (Parr 2005: 231). 'Tracing' is another comparative term Deleuze uses to explain the rhizome – as the rhizome is a map and *not* a tracing. I would like to, in aid of understanding the difference between the two, propose that Deleuze's 'map' is synonymous to some extent with the functional description of a map spoken of earlier (open, extendable, relational, experimental), whereas the tracing would be the actual map itself – the representation. Congruent with the functional description, Deleuze and Guattari (2004: 13 – 14) assert that:

> The map is open and connectable in all of its dimensions; it is detachable, reversible, susceptible to constant modification. It can be torn, reversed, adapted to any kind of mounting, reworked by an individual, group, or social formation. It can be drawn on a wall, conceived of as a work of art, constructed as a political action or as a meditation.

In contrast, he explains that a tracing has already translated the map into an image. It has organised, stabilised, neutralised and structuralised the rhizome. The trace holds onto something, represents it, pins it down – 'all of tree logic is a logic of tracing and reproduction' (Deleuze & Guattari 2004: 13); 'what a tracing reproduces of the map

or rhizome are only the impasses, blockages, incipient taproots, or points of structuration' (Deleuze & Guattari 2004: 15). In other words, the tracing defines the map, structures it, represents it and ascribes it an image.

Quite simply the rhizome/map is creative, constructive (built out of experimentation) and always in process. It allows us a way of viewing things differently, where instead of being bound to ideas of structure, coherence, categorization, classifications, order and hierarchies, the rhizome describes things that are always shifting, depending on what they come into contact with over time. For the remainder of this thesis I want to use the hippocampus/*Hippocampus* (cognitive map/seahorse) as a 'concept tool' similar to Deleuze's rhizome.

Kaplan explains that 'the cognitive map is a construct that has been proposed to explain how an individual knows their environment' (O'Keefe & Nadel 1978: 77). Hence, the hippocampus is an enabling tool, a functional and physical structure, with which to perceive and explain my environment – the space of my processes, sculptures, creation, destruction, and even this thesis. The space that I am pursuing is the space in which an image of a man-sized seahorse, a fractal folding in on itself, is located.

CHAPTER THREE

PROCESS

In this chapter I will look primarily at my working processes as the constituting factor in the development of the work. Each chapter heading will deal with a different aspect of my process; all processes explain in a different but supportive sense the tension between a structuring and ordering movement and then the dissolution of it, not necessarily as a destructive force but as a means to shift, move and develop. Deleuze and Guattari (2004: 22) explain this when they suggest that:

> there are knots of arborescence in rhizomes, and rhizomatic offshoots in roots….The important point is that the…tree and…rhizome are not two opposed models: the first operates as a transcendent model and tracing, even if it engenders its own escapes; the second operates as an immanent process that overturns the model and outlines a map, even if it constitutes its own hierarchies...It is a question of a model that is perpetually in construction or collapsing, and of a process that is perpetually prolonging itself, breaking off and starting up again. No, this is not a new or different dualism.

They explain that experimental and structuring forces are not mutually exclusive, but that there are ordering structures within experimentation and experimentation within structure, resulting in a dynamic process of creation and destruction.

Narrative/Structure

The appearance of a man-sized seahorse in my bed begged a narrative, a grand idea or reason – something that would give it the meaning and relevance that I felt it needed. I imagined all sorts of scenarios in which the seahorse was grounded in a representative structure that would provide the viewer clues towards understanding his story. Not only did I *desire* a narrative, I was sure there *was* one hiding somewhere, just needing to be found. I began a series of drawings to help me 'illustrate' the seahorse-story. I sketched scenarios in which he interacted with some other thing. I was trying to find his bearing, his relation. I wanted to learn about how he would interact, in which situations he would find himself and which he would not.

Instead of finding the grand narrative, I was left with the emptiness of a stifled story and, shortly after starting the drawings, I abandoned them. The 'deep narrative' of this creature had no storyboard or sequence of events that I could articulate. The narrative was intangible but very much alive.

A narrative has not revealed itself in a way I anticipated. My works developed through one visual experiment after the next with no specific goal, but I still find myself imposing an explanatory structure on the works; defining, delineating and categorizing them into different chronological 'series' that 'began' with the first sculpture.[14] This places a 'godlike' weight on to the first sculpture, the rest of the works mere derivatives and developments of it. It is almost as if one is programmed to find, extrapolate and articulate what something means, especially if that thing seems to defy or resist a fixed meaning. We tend to over-encode our readings of things, believing that every artwork is an expression or representation of some underlying meaning. Deleuze and Guattari speak of this as a 'micro-fascism' in everyone's head: 'the propensity for hierarchy, fixity and stasis (or simply representation)' (O'Sullivan 2007: 12).

A beautiful example of this propensity is found in the investigation by the mathematician, Bruno Ernst, of Escher's work. In 1956 Ernst embarked on an analysis of Escher's prints with the aim of establishing a system that covered all of his 'mathematical' work. His analysis began with the assertion that pre-1937, Escher tended towards depicting landscapes and post-1937 he tended towards mathematical works. His resultant study showed a unity, coherence and evolution in Escher's work, an evolution of which Escher himself was not consciously aware. Ernst described eleven categories[15] within which Escher worked. From these, he inferred seven

[14] There is the 'first seahorse', and then the 'three dimensional' series, the 'flat shadow' series, the 'rectangular grid' series and the 'pillar' series. I often refer to my work in these terms although in fact, they did not necessarily happen in this sequence or as conscious, clearly defined and delineated 'series'.

[15] These 11 categories were as such: 1 - regular spatial figures; 2 - regular division of the plane; 3 - spirals; 4 - Mobius strips; 5 - perspective; 6 - metamorphoses and cycles; 7 - approaches to infinity; 8 - the conflict of depicting something on a plane and the three-dimensional reality which is depicted; 9 - the penetration of more worlds; 10 - spatial anomalies (impossible figures); 11- relativities (Locher 1982: 135).

themes[16], which he used to deduce Escher's sources of inspiration. He proposed that these were 'the structure of the plane; the structure of space; the relationship between these two' (Locher 1982: 135). The interesting thing here is that Escher himself never categorised, thematised or qualified his work. More remarkably, Escher was not a mathematician and had a rather limited understanding of conventional mathematics[17], although his work was very mathematical. In fact, he said:

> By keenly considering and analyzing the observations that I had made, I ended up in the domain of mathematics. Although I am absolutely without training or knowledge in the exact sciences, I often seem to have more in common with mathematicians than with my fellow artists (Locher 1982: 55).

His work developed through visual experimentations, through trial and error, and it was more of a coincidence than a deliberation that he ended up in the realm of mathematics. He did not set out to illustrate the categories of interest that Ernst delineates, but it seems a natural inclination to impose structure in the pursuit and construction of meaning.

In order to create these categories one needs to find similarities or differences between things; to say that something is this and not that, to group like with like and to decide which objects carry a property called 'different'. An object of difference 'becomes an object of representation in relation to some identity' (Parr 2005: 72), a re-presentation of something as another instance of the original that it by default assumes. This idea of an original is anything that fixes and structures – an original artwork, an original idea, an original concept, from which everything after is derived. Deleuze challenges these traditional ideas of representation by suggesting one not presume an original, but accept things as they are perceived; that 'reality evidences difference' – 'there is nothing 'behind' such difference; difference is not grounded in

[16] The 7 themes are as follows: 1 - Penetration of worlds (category 9); 2 - The illusion of space (category 8); 3 - The regular division of the plane (categories 2 and 6); 4 - Perspective (categories 5 and 11); 5 - Regular solids and spirals (categories 1, 3 and 4); 6 - The impossible (category 10); 7 - The infinite (category 7) (Locher 1982: 135).

[17] 'He embarked on mathematics to deepen his study of the forms he desired to create and developed 'his "layman's theory" in order to own the knowledge. Escher's theory, recorded in his notebooks of 1941 – 1942, was never published; it was never meant to be explained or taught as an alternative classification system for regular division of the plane. It was simply for Escher's own use' (Schattschneider 2004: *xi*).

anything else' (Parr 2005: 72). Deleuze explains further, that difference is usually understood as either difference *from* the same (as with Ernst's understanding of Escher's work) or as difference of the same over time (as in my work – all subsequent sculptures derivatives of an 'original', with variations and degrees of difference from itself) (Parr 2005: 72). Either way, 'difference' implies a re-hash, re-presentation, re-configuration.

The 'structure' (or anti-structure) of the rhizome, however, promotes a system in which there are no categories or originals delineated by difference. There is no stabilising function, but only things shifting over time. On the contrary, a narrative chooses one explanation over another, one description over another, one story over another. It decides through a process of elimination what it is *not.* It *is* circumscribed within a difference of everything that it is *not*.

Binaries

Inherent within the idea of a man-sized seahorse is a binary – man/animal, a seahorse within a man-size, a man-size within a seahorse. We are constantly distinguishing one thing from another and grappling with the relationship between the two; meaning/object, content/form, depth/surface, signified/signifier, conscious/unconscious, author/writing, original/copy…and the list could go on. Something is always explained as *not* being another thing. I am speaking here about difference between one thing and another in the world, but I am also referring to a subtler difference: at the root of all the binaries we construct humankind's relation to the world. This is the quiet and invisible distinction we draw between the self and the other. We separate ourselves from the objects in the world, seeing ourselves as subjects in relation to them. The objects we create we think of as extensions of ourselves – a mirror and a representation of our subjectivity, an outer form of an inner content (O'Sullivan 2007: 16).

For many months, I tried to understand the seahorse's relation to myself. Before abandoning the inclusion of a self-portrait in the final exhibition, my thought was that these creatures would be a re-presentation of my inward self – a manifestation of my obsessions, my propensity to order, to measure and plan, and the chaotic disruptions that intercept these. I wanted the 'seahorse' to be a representation of my personality –

a manifestation of my inner content, a physical expression of a psychological state. I abandoned the self-portrait because I felt it imposed a certain reading onto a body of work that was becoming about something else, even though I was not yet sure what. Here, 'becoming' is the operative word, for I have never affixed an objective for this work. One sculpture provided ideas for the development of the next and so on.

Colebrook (2002: 145), when explaining Deleuze's notion of *becoming* (in contrast to the fixity of *being)*, says:

> We often think of becoming as something that a being does or goes through. Deleuze reverses this relation. There are becomings, such as actions, perceptions, variations and so on; from this flux of becomings we perceive or organise beings. We also tend to think of becoming and action as directed towards some end or goal, so that we become or act in order to be 'human' or moral. Deleuze argues that true becoming does not have an end outside itself…[and]…insists that we value action and becoming itself, freed from any human norm or end.

Hence, each sculpture I make can be seen as a *momentary being*, as stasis, in a flow of a *becoming of the seahorse*; a snapshot of what it may look like. As will become clearer in Chapter Four, my work is riddled with instabilities. It resists being cast into a binary, it does not want to be either this or that. It is paradoxical by nature. It is ordered and disordered and most importantly in a constant process of movement and stasis: 'the balance between regularity and irregularity, precision and imprecision, accent and interval, is precariously maintained, just' (Fer 2004: 51).

Measurement

Harmon (2004: 16) in her book, *You Are Here: Personal Geographies and Other Maps of the Imagination* said:

> We are damned by the arrogance with which we ignore the immensity of the frontiers we presume to tame with our absurdly precise instruments of measure, and redeemed by a cunning, even courageous naiveté that persuades us to believe that they are approachable, knowable, chartable.

When faced with a man-sized seahorse in all his uncertainty I began to measure him. This may have begun with ‘How big is man-sized?’ or ‘How big is a standardised man-size that would not make anybody feel particularly tall or short?’ As my research and planning of the seahorse developed it led to other questions, such as, ‘What are the dimensions of the first seahorse tail segment in comparison to the middle torso segment, and what relation would they have to each other in a seahorse standing upright but tilted forward at a 30 degree angle?’ With each new approach, my means of and reasons for measuring became more complex and refined and, inevitably, ludicrous. I obtained hundreds of comparative measurements for the seahorse sculpture from real seahorses preserved in bottles of formaldehyde, from scientific drawings, photographs, a dried seahorse given to me by a friend and various other sources. I was looking for the perfect combination of angles and elements to construct what I considered the most standardised, generalised, unambiguous and ubiquitous man-sized seahorse.

Following my books full of ‘man-sized seahorse’ calculations were the many sketched and reworked templates. I drew and redrew each segment of the seahorse from the smallest tailpiece up to the last torso ring. Each drawing adhered to a set of parameters and relational angles and sizes upon which I had finally decided. Small changes in the angles in one template meant applying those changes to all the others. I drew and redrew the templates until finally satisfied. I had achieved what in my mind’s eye was the perfect set of measurements. What I found amusing throughout this process of measuring the seahorse was my conviction of which measurement was right and which wrong. I felt as though I was conducting real science and that the resultant seahorse had mathematical integrity. I was continually amused by how seriously I took the measurements and by how ridiculous this actually was for my measurements were precisely that – mine. All the comparisons and shifting differences in sizes, shapes and angles were all of my own making and had no measurable truth to them, but I had prescribed a very specific order and correctness to what I was doing. It could be no other way. Measuring the seahorse was at least one thing I could do with the precarious image. I became obsessed with the tangibility of his size. Out of the measurements came an order within which I felt I could work.

The standardisation of the metric system (based on a set of societal and rather arbitrary conventions) allows everything to be relative and comparable – weight, mass, meter can all be converted, compared, related. Hence, the system has become quite abstract and this abstraction seems to aid in the madness and compulsion to measure things. As Harmon (2004: 16) put it: 'our absurdly precise instruments of measure'.

A desire to order, structure and understand the seahorse has resulted in the development of my own standards of measurement; something with which I could pin the idea down, saying that it exists because of and within these limits. Escher said:

> If you want to express something impossible, you must keep to certain rules…The elements of mystery to which you want to draw attention should be surrounded and veiled by a quite obvious readily recognizable commonness' (Locher 1982: 147).

Although my seahorse-measurements use the metric system (mm, cm, m), in another sense I have developed my own 'unit of measurement' or, rather, my own standards, parameters and limitations. There are some basic, standardised units of measure that do not change in my work. These are the curves, lines, segments and shapes. Each unit has a limitation, a point at which it no longer fits my system. My adherence to and attempt to break out of my system is what creates comparable points of access. It is how I search for what the seahorse is and what he is not. I bounce back and forth between structure and dissolution. It is almost as if I had decided the seahorse must exist somewhere within the confines of these 'units of measure'. My sculptures swing between ordered measurability and the dissolution and breaking out of measurability.

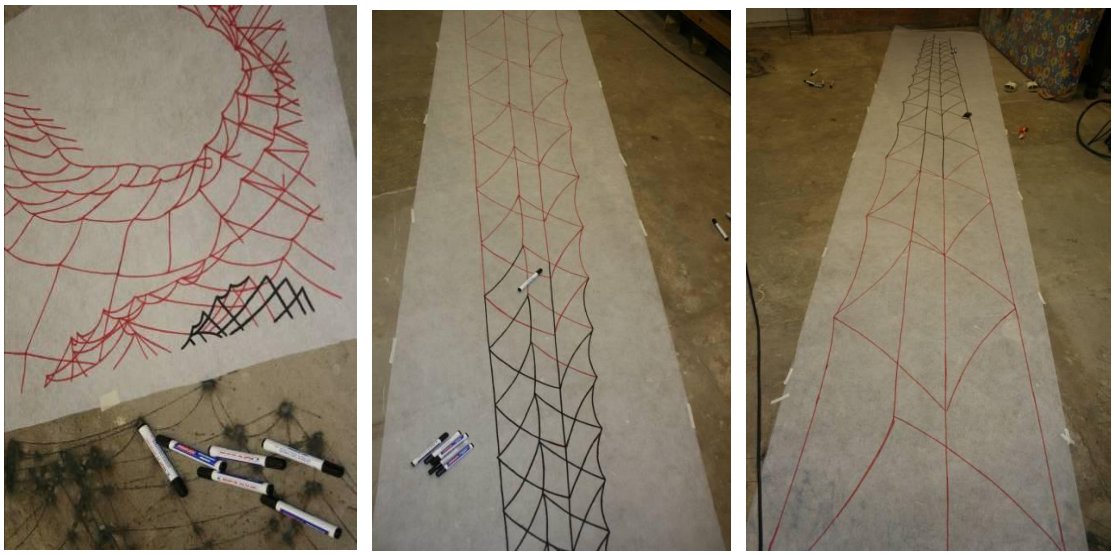
Repetition

Sometimes it feels like every act of my process is an endless and painful repetition: The straightening of the wire, easing out the creases bit by bit with the rolling back and forth and back and forth of the vice handle.

The measuring of the wire and the thousands of little black marks indicating where to cut, cut, cut.
The cutting of the wire and the up down, up down, up down of the bolt cutters.

The falling away of the off-cuts again and again and again.
The sifting and sorting of the off-cuts into like-sizes.
The labeling of this piece or that, slightly smaller than this or that, or bigger than this in relation to that.
The welding and the zap, zap, zap.
The up down.
Up down.
On off.
Up down, on off.
Sit down, stand up.
Sit down, stand up.

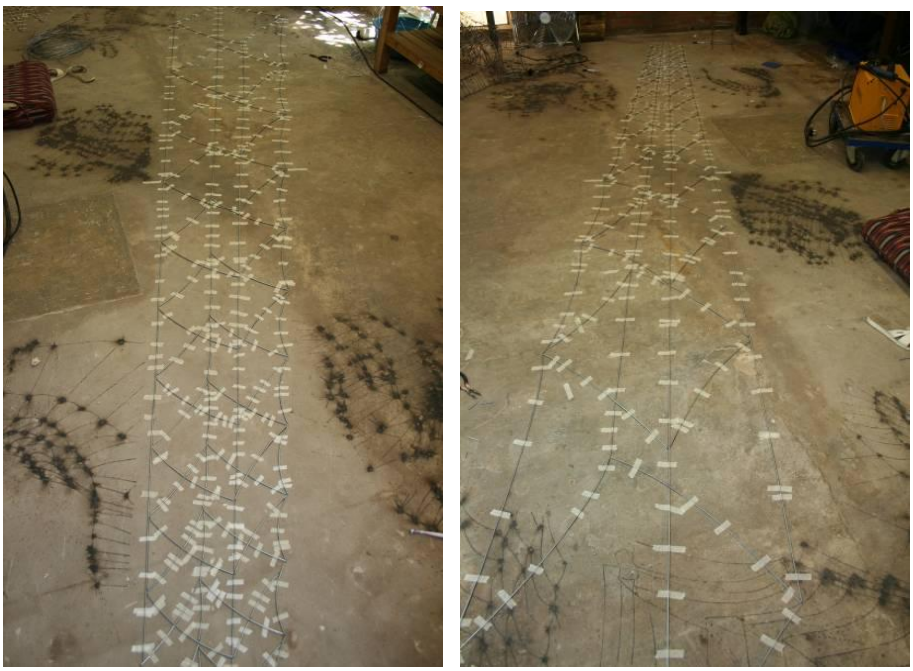
There is one repetitive process in particular on which I would like to expand, for it relates to Deleuze's notion of the 'tracing' as that which fixes, stabilises and structures an image or representation. For each flat sculpture, I go through a repetitive process of tracing. When casting the shadow of a sculpture some lines are clear but many lines are either overlapping or blurred (2009: Figs. 13.1 – 13.11). First, I draw around the shadow with pencil to obtain a general outline of the shadow's shape (Figs. 7.1 – 7.5). I then redraw solid lines into the first drawing, often having to improvise where one line starts and another stops (Figs 7.6 – 7.9). I then trace this image onto porous material (Figs. 20.1 – 20.3), as a means to transfer the image onto the ground and I then retrace the image on the material onto the floor (Fig. 21).



Figures 20.1 – 20.3. Tracing the shadow drawing onto porous material.

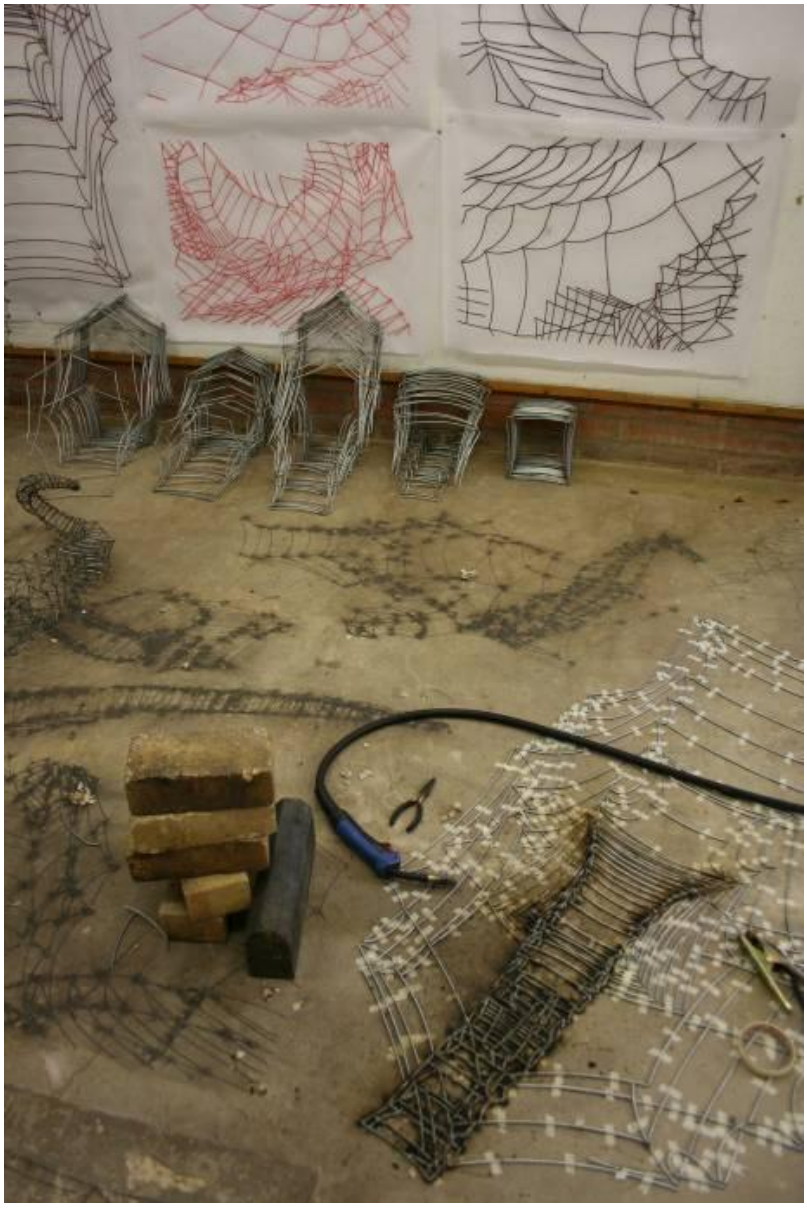
Figure 21. Tracing the shadow drawing onto the floor.

The ink bleeds through the material onto the concrete floor on which I weld. Each tracing slightly alters the first drawing, but nonetheless is a re-instatement of a chosen image. The 'captured' image of a fleeting shadow is traced for the last time, with wire, into a stable form (Figs. 22.1 – 22.2). The sculpture then leaves a tracing on the floor, burnt in by the welding process (Figs. 23 & 24.1 – 24.2).



Figures 22.1 – 22.2. Tracing over the drawing with wire.

Figure 23. The trace of the burn marks left after welding.



Figures 24.1 – 24.2. Studio shots depicting all of the ‘tracings’ involved in making a flat sculpture. The drawings, material, wire and burn marks.

All of my sculptures have a sense of repetition about them because of their similarity visually and in materiality. In my pillar works (*Hippocampus 13, 14 & 15* 2010: Figs. 17.1 – 19.8) in particular, the repetition of shapes and segments becomes more overt. Individual segment shapes repeat themselves with systematic and uniform regularity. Whether they are short or tall structures, they give the sense of an endless repetition or, at least, the potential for and endless recurrence of the same shape.

Repetition implies the duplication or reproduction of something (but not necessarily the same thing) occurring over and over again. In my work, there is variation in and through every repetition; a discovery and experimentation. There is no object, no final goal, and no specific direction, 'in a very real sense, repetition is a creative activity of transformation' (Parr 2005: 224). Repetition contains the possibilities of reinvention and dissolution of identities, leaving space for new production and the unrecognizable. In each pillar the identity, the cohesive and recognisable form of a seahorse, is dissolved as a single structural element is replicated and repeated. However, a new and reinvented 'seahorse/map of space' appears as an architectural structure, a building block or signifier of an endless potential.

In the repetition of my actions, my processes and the sculptures themselves, there is a persistent movement towards the form of the seahorse. Sometimes moving towards it means to move away from a preconceived idea of its form, the dissolution of form enabling a reconfiguration towards it again. It is within the continual repetition of processes, movements and sculptural elements that this pattern can be recognized because the stability one presumes inherent in repetition shows itself to be not so stable, at least not always. *Repetition enables dynamism.* There is a constant arranging and rearranging of effective elements. Sometimes the elements combine into greater wholes, structures with order and symmetry, and sometimes the combination results in decomposition and a re-composition. This is the function, for Deleuze, of experimentation – an act without aim or end, by nature. It does not want to know what something 'means' but to discover how it functions (Parr 2005: 91). Experimentation

implies a process of assimilation and accommodation between the known and unknown, the predictable and unpredictable, the chaotic and ordered. [18]

[18] In explaining how an individual builds up a concept of space over time, a concept of space that is retained within the cognitive framework of the hippocampus, O'Keefe and Nadel refer to the work of Piaget. Piaget did not believe that the ability to perceive space was an inborn/inherent given but rather the result of experience acted upon and organized by the subject. The 'structure of an organism interacts with the structure of the external world in a constant dialogue, the end-product being an increasingly refined version of the real world' (O'Keefe & Nadel 1978: 42). The dialogue he speaks of is a process of assimilation and accommodation. He believed that heredity gives one a set of sensori-motor co-coordination, such as grasping and sucking. Beyond this, an individual builds up a mature view of reality through an endless chain of assimilation and accommodation (O'Keefe & Nadel 1978: 42). It would seem that he speaks of process more than product; one's understanding built through experience. Repetition enables experimentation, experience and an end-product, 'a refined version of the world'. Space for Piaget has no 'meaning', no transcendent unity. It just becomes.

CHAPTER FOUR

SPACE

The space being mapped, by a seahorse, is the space in which a man-sized seahorse appeared in my bed: a no-man's land between dream and reality, appearance and illusion, self and other. In the previous chapter I unpacked a few of the processes involved in the development of a body of work that is possibly about a seahorse, but also possibly about nothing more or less than the processes. None of my processes is without a certain ambiguity in intention and action: a tension between the meticulous structuring of an image and the defiance of that image without a structure. In this chapter, I will 'map' the physical space in which an image of a man-sized seahorse in my bed is located by looking specifically at the sculptures that I have made.

My exhibition, '*Hippocampus*', (Refer to Installation photographs in Appendix A) is made up visually of lines, shapes and shadows. Some works occupy a three-dimensional space but they lack the weight and volume of sculpture and look more like drawings in the air. Some works that look like drawings occupy two-dimensional planes but they give the illusion of occupying three-dimensional space. Some works are flat, but also folded and occupy two planes, but little space. Some works are spatial that flatten and others are simply flat sculptures. Some works have shadows. Some works are shadows. Some shadows have shadows. Some works have shadows attached to them that look like sculptures. All works have a shape – the shape of a seahorse.

In an interview between Turner and Victor I. Stoichita (1997), author of *A Short History of the Shadow*, Stoichita clarifies that in his book he explores the writings of Plato, Pliny and Piaget to explain how the shadow has always been integral to theories of art and knowledge.[19] He explains Piaget's notion of the 'shadow stage', which is

[19] The 'shadow' features in analytical psychology, according to Carl Gustav Jung, as a concept that comprises everything the conscious personality experiences as negative. 'In dreams and fantasies the shadow appears with the characteristics of a personality of the same sex as the ego, but in a very different configuration. It is presented as the eternal antagonist of an individual or group, or the dark brother within, who always accompanies one' (de Mijolla 2005: 1596). If one desired, this

the point at which a child first realises that the shadow does not emanate from an object, nor does it come from a dark place, but in fact is an absence of light. The shadow is then recognised as a representation of otherness, opposed to the 'self'. This is similarly recognised in Lacan's mirror phase[20]. Stoichita cites Plato's cave as one of the oldest references to shadows:

> The prisoners of Plato's cave were incapable of gazing directly into the light of knowledge. They had their back to this bright light and saw only the shadows cast on the cave walls' (Turner & Stoichita 2007: page number not specified).

Plato's point was that they saw only the shadow of reality, not reality itself. For Plato, the shadow is a negative image – a mere copy of reality, an ignorance – and 'knowledge' is gained when one awakens to the realisation that his 'reality' is only a representation of reality. Pliny on the other hand proposes the shadow as the origin of painting and sculpture. He describes a love story in which the maid of Corinth traces her lover's shadow on a wall in order to capture his image. According to the story, the first act of representation would not have resulted from direct observation of a subject but by capturing this body's projection, by drawing or circumscribing the human shadow. In brief: shadow was captured initially in outline. Then the outline was filled with monochrome colour to make a silhouette. Then light, shade and contrast were differentiated and thus painting developed. Contours were then filled in with clay, which resulted in relief sculpture and eventually the form was brought right off the surface altogether until the 'shadow' occupied three-dimensional space (Stoichita 1997: 15).

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psychoanalytic reading of the shadow could be applied to this image of a man-sized seahorse in my bed –the dream-vision and the 'brother within, who always accompanies one'. The unconscious, the dream, the double. I have purposefully not developed any such ideas in this thesis as I feel it is irrelevant to my argument as well as it feeling like a forced and contrived reading of my work that has little relevance to my working processes.

[20] 'The mirror stage describes the process by which subjectivity comes into being, according to the psychoanalysis of Jacques Lacan. The mirror stage stands as a fundamental component in the inauguration of Lacan's thoughts…[he] first describes the concept in the 1930s, seeing it as being a localizable moment in time in the development of the child: at some point between the ages of six and eighteen months the child recognizes the image in the mirror as its own' (Taylor & Winquist 2001: 162).

The shadow is an imperfect imitation, an indistinct image, a two-dimensional double of, usually, a three-dimensional form. It is an indication that something has been present; a trace of evidence of a form that is, by nature, inseparable.

In my body of work I use the shadow mostly as a process-based 'tool'. It is my go-between, the 'middleman' that helps me move from one sculpture to the next. Hence, and in some way, Pliny's explanation is relevant to my practice in that I use shadow as the origin of sculpture. A shadow is the inseparable companion and double of a form, but it is enigmatic, sometimes fleeting, blurred, faded and distorted. In my flat shadow works (*Hippocampus 7, 8, 9* & *10* 2009: Figs. 9.1 – 12.3) I choose just one shadow out of the myriad possible castings and capture it, draw it, sculpt it, fix it. In doing so I start blurring the binary of form/shadow, light/dark, tangible/intangible. My sculptures become shadows and the shadows become sculptures. This process could go on *ad infinitum*.

Other than the more obvious flat shadow sculptures, in my rectangular grid pieces, (*Hippocampus 11* 2010: Figs 14.1 – 14.19) shadow and sculpture are undifferentiated, conflated and fragmented. There are no clues as to where the shadow began and the sculpture stopped and *vice versa*. A similar conflation is seen in, (*Hippocampus 11b* 2009: Fig. 15.1 – 15.2), where sculpture and shadow have been compressed into a single image such that they are inseparable and almost indistinguishable. In my final exhibition installation (Refer to Installation images in Appendix A), all sculptures will cast shadows and thus it becomes even more difficult to know where the representation begins and ends.

This desire to turn the ephemeral shadow into a tangible form is not a novel concept as we have seen in Pliny's love story, but there is possibly a more deep-seated preference here for three-dimensional objects over two-dimensional shapes; a preference for volume over surface. Escher, a graphic artist who worked on flat, two-dimensional surfaces/planes, was fascinated with images that represent three-dimensional spaces because these images are always illusions. We perceive three dimensions when there are actually only two-dimensional planes. The human brain is always making the two-dimensional spatial. Escher explains this as such:

> Every spatial picture on a plane is based on illusion. The surface used for the drawing is flat, two-dimensional; however, we perceive what is being depicted as spatial, three-dimensional. This can be explained quite simply: the retina in our eye can be regarded as a plane. Thus the image of the (three-dimensional) space around us that is projected onto the retina through the lens in our eye is also flat – that is, two-dimensional. Whether we are looking at a white cardboard cube or at a drawing consisting of nine lines [Fig. 25]…makes no difference to us: the image on the retina remains the same. (the question of stereoscopic vision – with both eyes – is not considered here; we perceive the world around us as being spatial even when we are looking with one eye.) From an early age we become used to *interpreting* the two-dimensional image on the retina as being three-dimensional'(Locher 1982: 138).

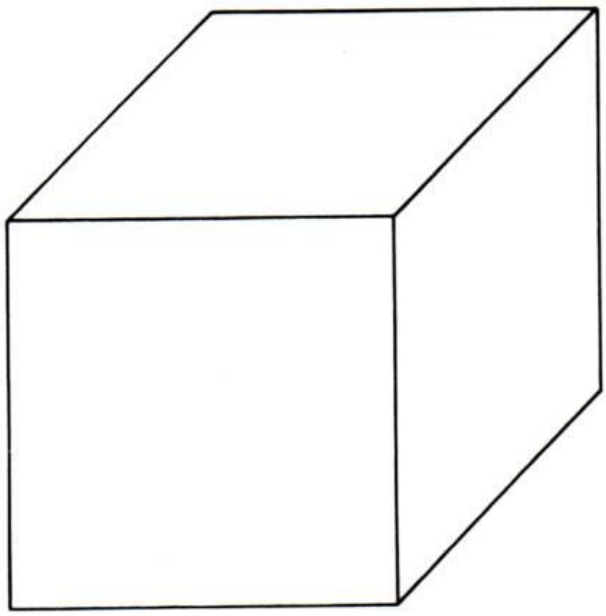


Figure 25. These nine lines suggest a spatial object, a cube.

This is similar to the trickery of the shadow: imagine a shadow seen, but isolated from the object casting it. One would not interpret the shadow's shape as being flat but instead would try to evoke a mental image of the form blocking out the light (this form usually being a three-dimensional object). Escher works consciously with this tendency toward three-dimensional perception. He makes images that seem to be saying to the observer 'Look at it – it's flat, and always will be flat', but in vain, the illusion persists (Locher 1982:138). He plays with this illusion in many different ways. He explicitly demonstrates this phenomenon in *Three Spheres 1* (1945: Fig. 26) where:

No spheres [three-dimensional objects] are depicted, but flat [two-dimensional surfaces] planes. The network of white ellipses suggest a spherical shape. In the top figure we see a frontal view of the flat plane; the three-dimensional suggestion is obvious here [it looks like a ball]. The central figure has been cut from a sheet of drawing paper on which the top figure is shown, and then folded over. The fold should hinder the illusion of space; but no, we immediately turn it into a three-dimensional object [a ball sliced in half or squashed]. At the bottom Escher put another copy of the top figure, now lying 'on the floor' but we refuse to believe this and see it as an elongated egg (Locher 1982: 138).

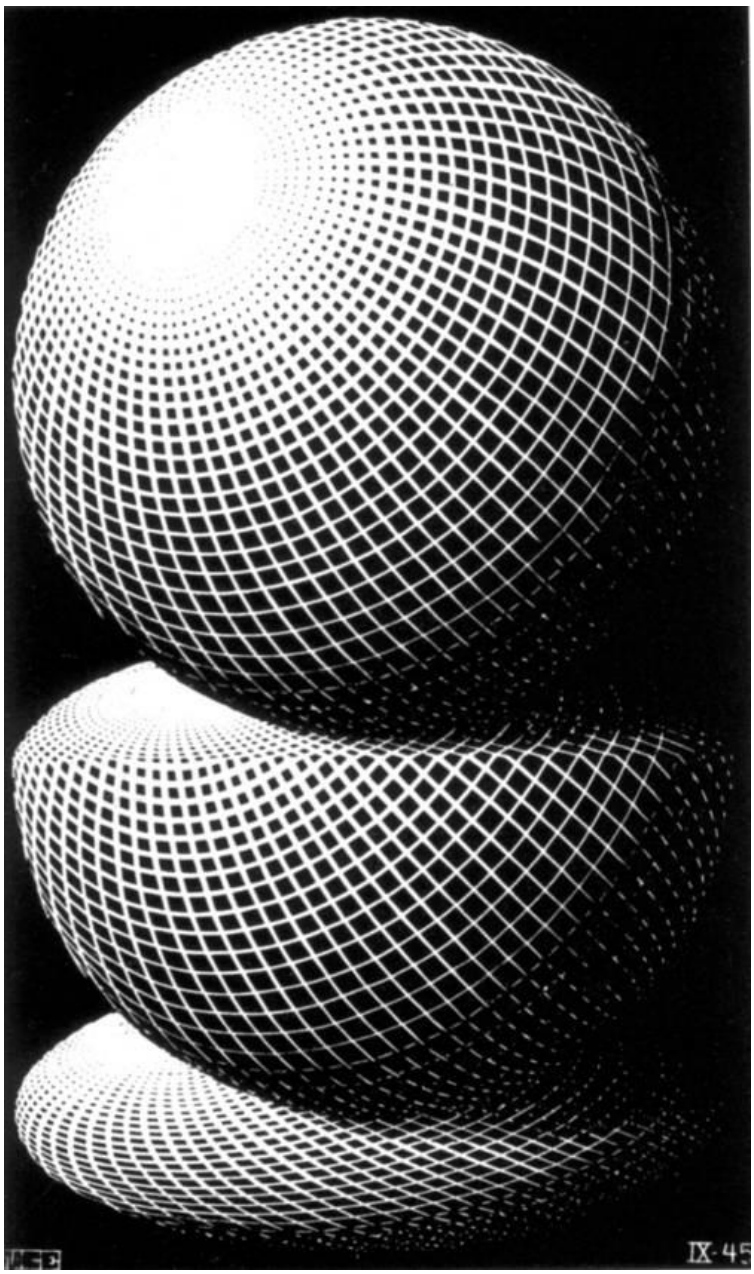


Figure 26. M. C. Escher, *Three Spheres 1*. September 1945. Wood engraving 279 x 169 mm

A photographic demonstration of this is seen in (Fig. 27). The implication that the brain interprets flat images as three-dimensional is clear. Further, not only do we *want* to interpret images in this way, it is difficult not to. Even once we know what his experiment is showing, when we look back at *Three Spheres 1,* we see form and volume once again.

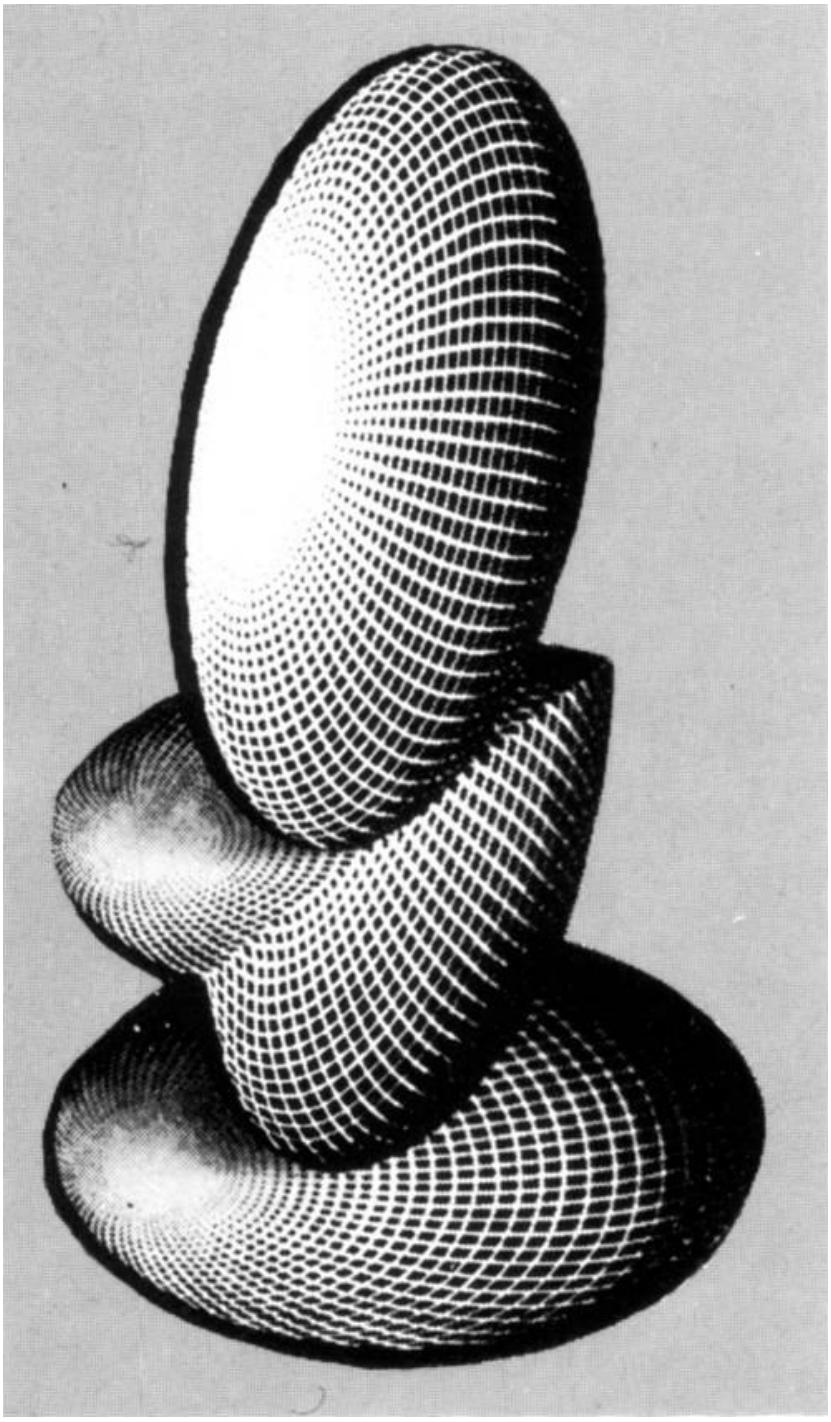


Figure 27. Photograph illustrating the 'intention' of *Three Spheres 1*.

In (*Hippocampus 9* 2010: Figs 11.1 – 11.6), the sculpture is folded in half, similarly to how Escher folded the middle circular plane in half. In my sculpture there is no optical illusion, as such: it is simply folded. However, it seems to demand more space even though it is not occupying more. The viewer's relationship to the work is more spatial even though the work is still flat.

This same play with perception is used in many of Escher's prints. In a very well-known lithograph, titled *Reptiles* (1943: Fig. 28), we see tessellated line drawings of lizards going through a spatial metamorphosis as they walk out of the page they are drawn on, gradually fleshing out and becoming three-dimensional, walking across the objects on the desk, only to return to the page, flatten out and become drawings again.

Figure 28. M. C. Escher. *Reptiles.* March 1943. Lithograph 334 x 385 mm

It is easy to dismiss this image as just a novel idea, but I feel that in its simplicity Escher is making a very pertinent point. None of the lizards are in fact three-dimensional. This may seem obvious as we know we are looking at a flat image but our perception is that certain of them occupy space while others do not, when in fact none of them do. 'The spatial quality of the reptiles is merely *illusory*: they may have crawled out of the plane of the *drawing* but they are still in the plane of the *print*; their return to the sketchbook is therefore not an essential loss' (Locher 1982: 138). This idea of the flat plane becoming spatial but ironically still bound within the print is also seen in *Day and Night* (1938: Fig. 29) where geometric planes turn into flying birds and in *Cycle* (1938: Fig. 30) where three dimensional people seem to fall out of 'space' into the picture plane. In these images it is impossible to keep both readings of space – as either two or three dimensional – stable in one's mind.

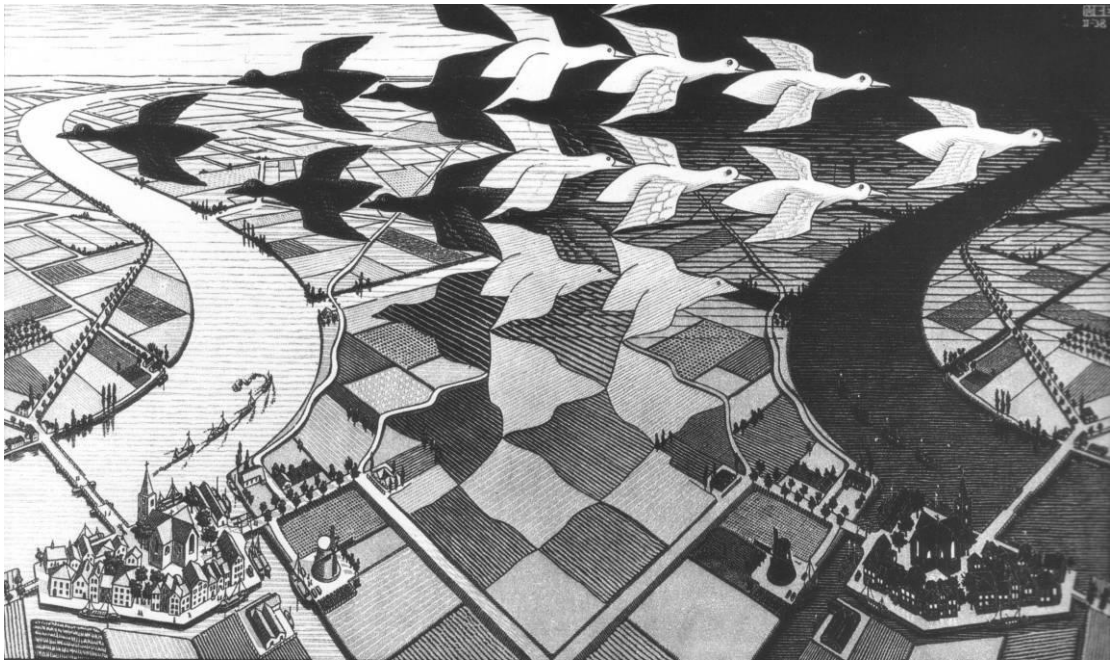


Figure 29. M. C. Escher. *Day and Night*. February 1938. Woodcut in black and grey, printed from two block 391 x 677 mm

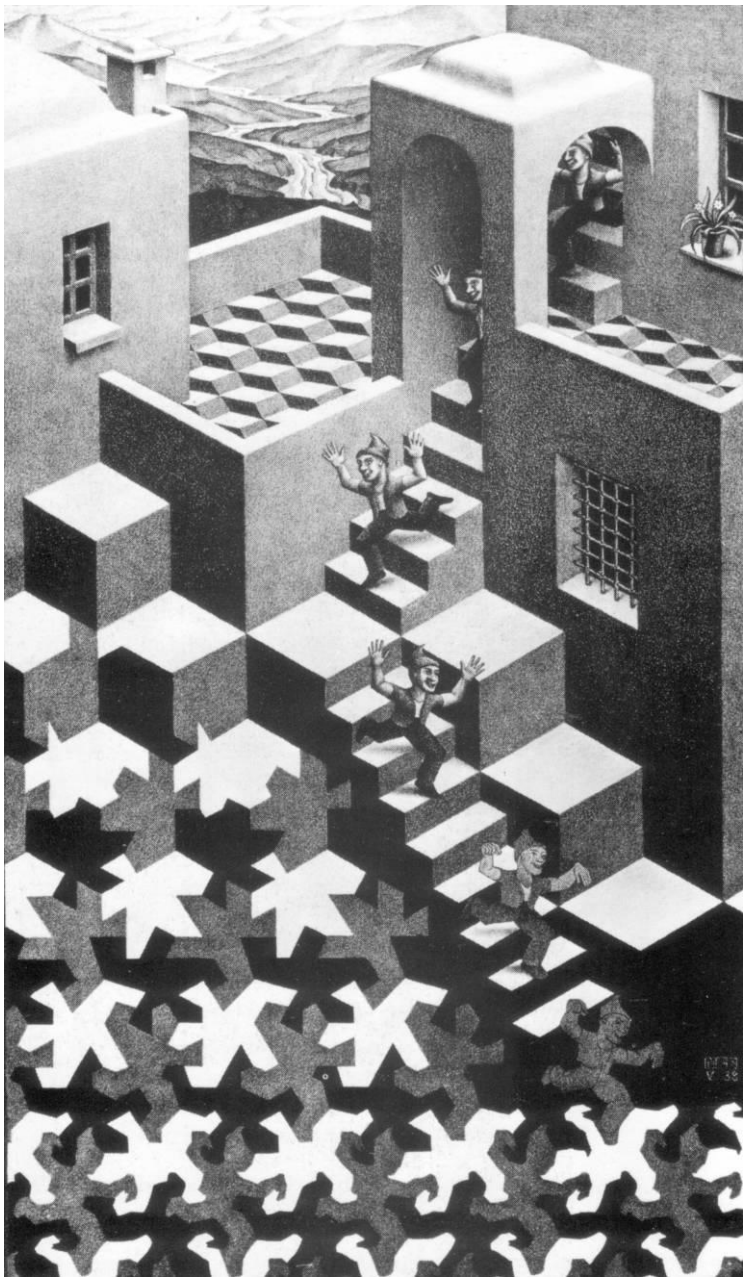


Figure 30. M. C. Escher. *Cycle.* May 1938. Lithograph 475 x 279 mm

I would like to return momentarily to O'Keefe and Nadel's theories of the cognitive map as they believe that this tendency to interpret three dimensions when there are only two is an innate function of the brain. They assert that the hippocampus' cognitive map secures our perception of space within a 'unitary framework stabilising a three-dimensional world' (O'Keefe & Nadel 1978: 52). These ideas are similar to Kant's notion of space perception. Kant believes two things in general: firstly, that 'three-dimensional Euclidean space [space as it is understood and measured still

today, e.g. 2D and 3D] is a form imposed on experience by the mind' (O'Keefe & Nadel 1978: 24). Kant asserts that objects themselves do not actually possess the geometric and measurable spaces that we ascribe to them, but instead the geometry is a convenience within which one chooses to perceive (O'Keefe & Nadel: 1978: 34). He said, 'Space was a way of perceiving, not a thing to be perceived' (O'Keefe and Nadel 1978: 19). His second assertion is that 'this unitary framework, conveying the notion of an all-embracing, continuous space is a prerequisite to the experience of objects and their notions' (O'Keefe & Nadel 1978: 24).[21] In other words, without this inbuilt perceptive ability, one would not be able to perceive and experience the physical world.

O'Keefe and Nadel similarly believe in an innate perceptive mechanism (in their case the hippocampus' cognitive map), but that it is not a matter of convention which metric was chosen. Rather, the metric is specified and bound to the physical structure and that we are bound to perceive in this metric. They are not concerned with the properties of physical space. The advent of non-Euclidean[22] geometries and relativity physics have shown that space may be more complex and less rigid than what was thought, that spaces of more than three dimensions are possible or are mathematically coherent and comprehensible, if not necessarily visualised.[23] But according to the properties of O'Keefe and Nadel's cognitive map theory, 'we *must* perceive the world in these terms [Euclidean spaces], though we *can* conceptualise it in other' (O'Keefe & Nadel 1978: 59).

Hence, indirectly, O'Keefe and Nadel provide an explanation of why we are bound to see in three-dimensions, the 'phenomenon' that Escher plays with in his work. As stated in Chapter Two, in newer theories of the cognitive map, space perception is a

[21] He did not believe that nothing existed outside of minds/concepts of consciousness, but instead that we cannot know anything of the external world outside of what our minds perceive. Knowledge is derived from consciousness and the world outside of consciousness is unknowable (O'Keefe & Nadel 1978: 24).

[22] Euclidean space is 'a term used to describe ordinary two- or three-dimensional space.' Non-Euclidean space offers an alternative account of physical space, that of curved spaces and Einstein's theory of relativity.
From 'Euclidean space' A Dictionary of Statistics. Graham Upton and Ian Cook. Oxford University Press, 2008. Oxford Reference Online. Oxford University Press. Rhodes University Library. 12 February 2010,http://www.oxfordreference.com/views/ENTRY.html?subview=Main&entry=t106.e553

[23] 'This led to questions as to whether physical space had a true metric or whether it was a matter of convenience which metric was chosen, or even whether it had a metric at all' (O'Keefe & Nadel 1978: 10).

less fixed, cohesive and structured phenomenon and more open and fluid, like the rhizome. I do not claim to provide the answers to questions of space perception. What I am interested in is that, for whatever reason, we do indeed have a tendency to perceive in a spatial (three-dimensional) manner. What is conceptually understood or conceivable of two, four or even non-Euclidean dimensions does not conform to the manner in which we perceive. Even if this perception and the way we talk about space is a matter of convention, I am only interested in the fact that it is so. I feel that work like that of Escher's is interesting for, firstly, showing up this propensity and, secondly, in showing how partial our perception of space is – how one can be so easily fooled. As Escher said:

> Imagining the two dimensional seems as difficult as imagining four. If any element on a plane suggests a shape of something recognizable we immediately think of volume, we give it a form (Locher 1982: 168).

We extract mental holograms of shapes, lifting them off the plane and into our mind's eye as spatial objects. Even when the shape is abstracted and unrecognizable, we still need to name it as a spatial object we recognize. *Hippocampus 7* becomes a Loch Ness Monster, *Hippocampus 8*, a dragon. We see form in almost anything. This raises the question: what exactly is it about a shape that makes one think of volume?

Zygmunt Pizlo in his book, *3D Shape: Its Unique Place in Visual Perception*, outlines the history of shape perception by interrogating exactly how it is that two-dimensional retinal images are translated into perceptions of three-dimensional *shape* (and, by extension, three-dimensional space). He strives to discover what the most basic information is that the brain needs to interpret form so that human perception can one day be replicated in machines. He reveals that past studies have concentrated on the surface of shapes and on the role of 'depth cues (texture, shading, motion and binocular disparity)' (Pizlo 2008: 115), because these individual cues could easily be manipulated. Three-dimensional shape is easier to see when an object is solid and has a surface. This is seen in observing the transition from block 7 to 8 in Escher's *[Regular Division of the Plane 1]* (1957: Fig. 31), in which the addition of very basic lines that describe a surface are capable of giving shapes recognisable form, defining

a foreground and background and separate images as being different from one another (Locher 1982: 158).

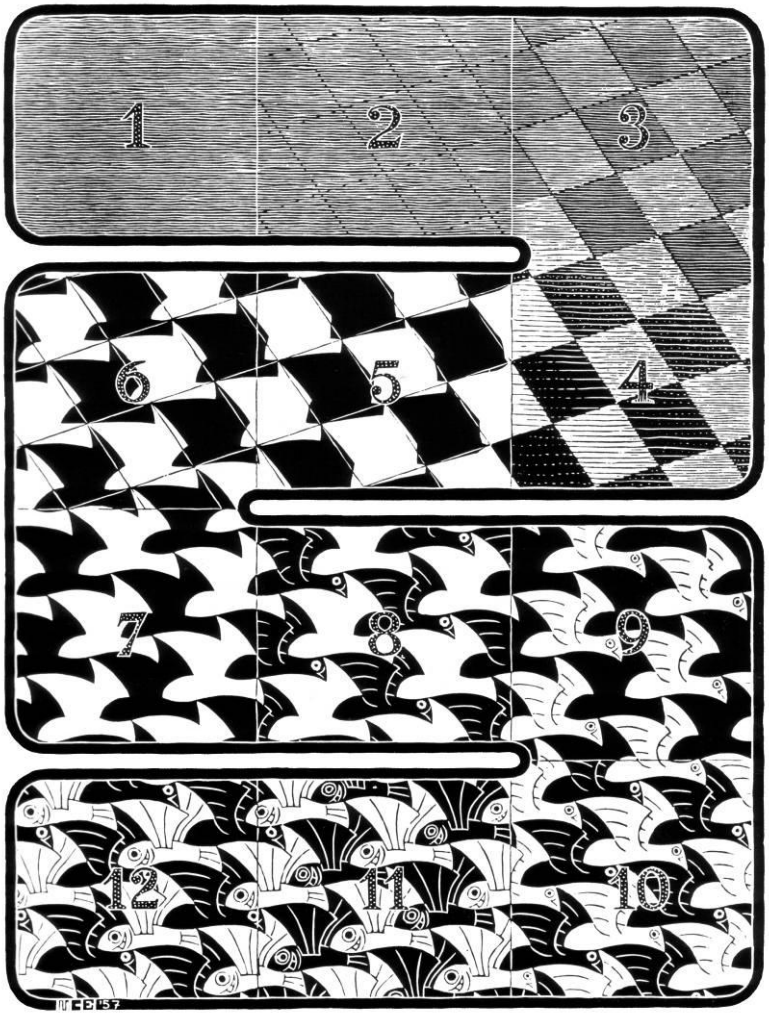


Figure 31. M. C. Escher. *[Regular Divison of the Plane 1]*. June 1957. Woodcut in red. 240 x 180 mm

One can imagine that if the bird in Figure 8 was further endowed with textures and shading that it would be even more recognisable as a three-dimensional, 'real' bird. However, Pizlo's argument on shape perception moved away from the study of depth cues to the importance of figure ground organization.

Imagine a line drawing of a still life (Fig. 32) where each object is 'defined by the contours that give them shapes' (Pizlo 2008: 146), in other words, objects described only by their outlines, 'perpetually segregated from each other and from their background' (Pizlo 2008: 146).

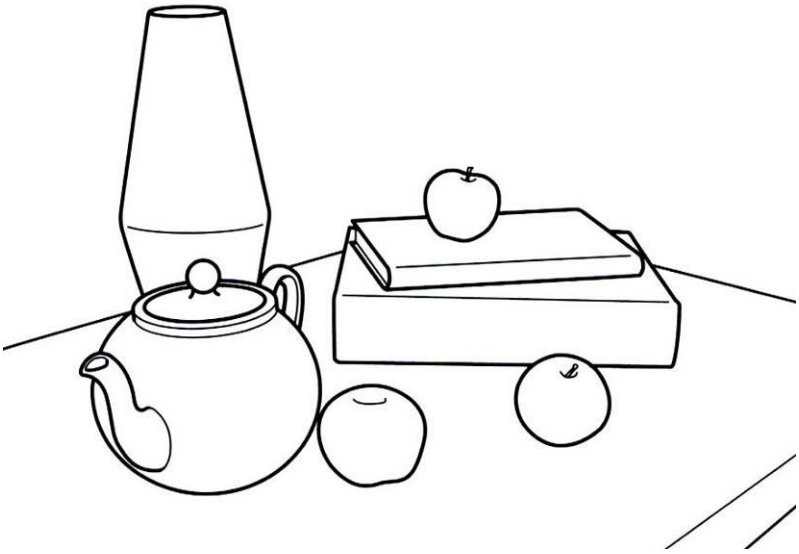


Figure 32. Line drawing of a still life.

Each outlined object will have a certain level of symmetry with itself and our brains will recognize them as being different from the other objects' symmetry with themselves. One would still be able to recognize each object and see which of them are nearer and which are further away due to their relative symmetries, sizes and overlapping. This is the cue for three-dimensional space perception for as soon as something is perceived as being in front of something else (according to our experience of the tangible world in which we live), it is perceived as residing in space, and things in space have form or are three dimensional (Pizlo 2008: 146). Pizlo purports that the *figure ground organization* of *outlined two dimensional shapes* is the foundation of three-dimensional shape perception.

In many of Escher's works Pizlo's basic premise is problematised. Escher was interested in regularly dividing a flat plane/surface into tightly cluttered shapes where each shape fitted like a puzzle piece into the next (tessellated), as seen in *[Regular Division of the Plane 1]* (1957: Fig. 31). There are no 'empty spaces', no gaps between images, no obvious or particular foreground or background, and each image is similar to the one adjacent. There is an 'impossibility of seeing both object and ground simultaneously and [an] inability to simultaneously interpret each with equal importance' (Schattschneider 2004: 279). How does one recognise form with very little difference in shape and no apparent background? On filling space with shapes or motifs he asks 'Is it possible to create a picture of recognisable figures without a

background?' (Locher 1982: 160). An ophthalmologist friend of Escher's, J. W. Wagenaar, on providing an answer to Escher's question said:

> In my opinion you [Escher] do not in fact create pictures without a background. They are compositions in which background and figure change functions alternately; there is a constant competition between them and it is actually not even possible to go on seeing one of the elements as a figure. Irresistibly the elements initially functioning as background present themselves, in a cyclical way, as figures. Your compositions do not have a visual static balance but a dynamic balance, in which, however, there is a relationship between figure and background at every stage (Locher 1982: 160).

The artworks utilising 'regular divisions of the plane' provoke an interesting spatial scenario, in which there is no obvious anchor with which to secure a foreground or background and, thus, the shapes oscillate. Even when the individual shapes have many depth cues, such as a detailed surface texture and shading, those forms themselves do not seem to actually occupy environmental space, at least not consistently. Their space is dynamic and not static; an in-between space, perhaps.

In my sculptures I have minimised most depth cues. Other than the three-dimensionality of the 4mm wire itself, there is little solidity, texture or surface to any of the sculptural 'forms'. It is as though I am sculpting in outlines, which according to Pizlo is the basic requirement for three dimensional shape perception. I want to reiterate a point to make clear my following argument: the retina of the eye receives two dimensional images and from those the brain perceives three dimensions. By extension, in order to *perceive* space, there is no difference between looking at a two-dimensional representation of an object or the object itself. The main variable at hand is our *perception*, not the image, object or representation. It is with this in mind that I speak about my own work. It is not the physical space of my sculptures that I am interested in (I am aware that they exist as objects that I can touch, move or walk in between and I do not claim that they have any super-natural qualities), but their *perceptual* space.

Although the nature of physical space is highly contested, it seems agreed upon that we perceive within a metric of two and three dimensions and it is this perception that I

am interested in. In the more obviously three-dimensional works (*Hippocampus 1, 2, 3, 4, 5, 12, 13, 14* & *15* 2009-2010: Figs. 1.1 – 5.4 & 16.1 – 19.6), it is clearer that they occupy space; in an installation (Refer to Installation images in Appendix A) they will overlap one another, are clearly separable and 'three-dimensional' in the sense that one can walk around them. But at the same time, in their drawn quality they seem somehow 'less' than sculptural; somehow less than three-dimensional.

In my flat shadow works (*Hippocampus 7, 8, 9, 10, 11* & *11b* 2009-2010: Figs. 9.1 – 15.2) the sculptures *appear* neither consistently flat, nor consistently spatial, as the broken, fragmented and non-cohesive lines disallow an image of a consistently whole form. The eye oscillates between the two states. One can neither evoke a mental hologram of a form being represented nor accept, perceptually, that the image is flat. In my square pillar work (*Hippocampus 13* 2010: Figs. 17.1 – 17.4) there is a combination of the two above-mentioned 'types' of work. A three dimensional pillar casts a shadow and that is sculpted as a flat sculpture, as though the pillar was squashed flat on the floor. If we perceive the flat shadow as being spatial (Hippocampus 13 Fig, 17.3) then it confuses our understanding of the actually spatial pillar that seems to then occupy *more* space. Perceptually, one could argue, there is no difference between the shadow and the sculpture and thus the figures oscillate – as the mind tries to understand what space they occupy. In many works one could argue that there is no clear *perceptual* indication whether a sculpture is a sculpture, a shadow, a sculpture of a shadow, a shadow of a shadow or any other combination. There is an illusion and dissolution of perceived space – never one or the other and always shifting, oscillating and changing. It becomes an intangible space that is strangely real.

Escher depicts, what he termed, 'impossible constructions' (Locher 1982: 147). He is 'fascinated with the perception of space and dimension; through his prints, he wishes to jolt viewers into questioning the "reality" of their perceptions' (Schattschneider 2004: 260 – 261). He meticulously calculates images that would suggest things which cannot actually exist. 'In contrast with the irrationality of the Surrealists, Escher's context is strictly rational; every illusion that is created is the result of a totally reasoned construction' (Locher 1982: 138). He creates images that are 'quasi-spatial' for they 'seem to be three-dimensional structures; they can be drawn on a flat surface,

but could not possibly exist as spatial [constructions]' (Locher 1982: 147). During a lecture in Amsterdam in 1963 he said:

> In my opinion an impossible situation only really stands out when the impossibility is not immediately obvious. If you want to draw attention to something impossible, you must try to deceive first yourself and then your audience, by presenting your work in such a way that the impossible element is veiled and superficial observer would not even notice it (Locher 1982: 147).

In *Waterfall* (1961: Fig. 33), Escher constructs a structure based on three Penrose triangles (Fig. 34).

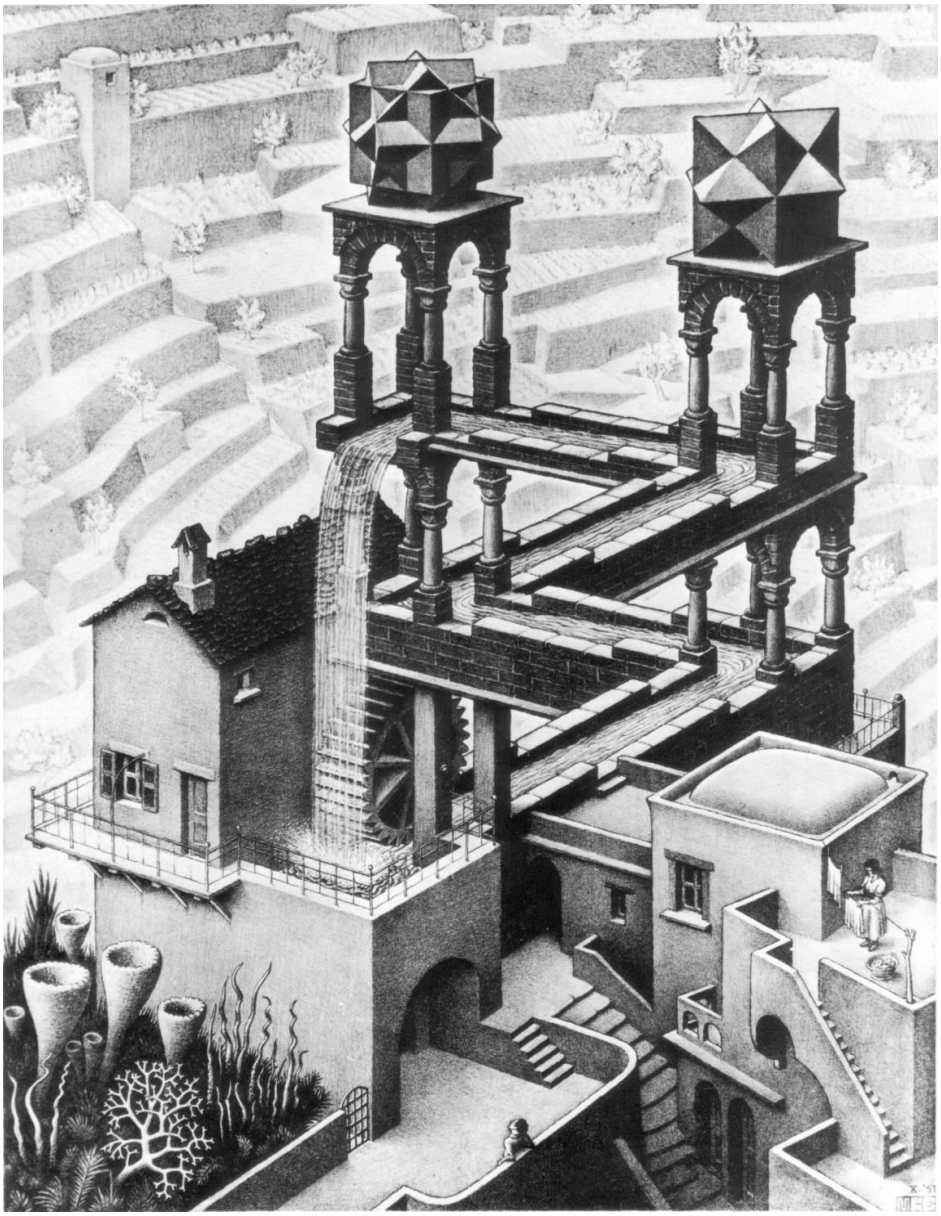


Figure 33. M.C.Escher. *Waterfall.* October 1961. Lithograph 380 x 300 mm

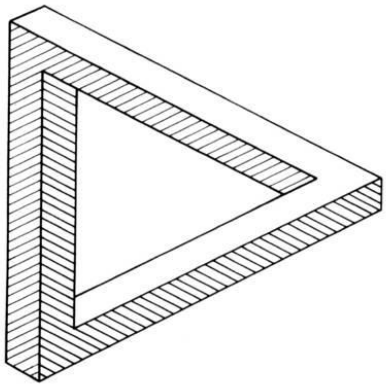


Figure 34. Roger Penrose's triangle.

In a Penrose triangle, 'three bars at right angles to each other seem to form a spatial object. At the corners nothing is wrong, but, going from one corner to another, you notice that there is something wrong with the connection' (Locher 1982: 148). The triangle cannot be constructed as a spatial object. In *Waterfall*, pillars seems to hold up structures that are beneath them and water flows both up and down feeding back into itself, against gravity and rationality. In my flat shadow sculptures I have created a similar scenario, but made in reverse. I have taken three-dimensional objects that do exist in space, cast their shadows and allowed the dissolutive effect of the shadow itself, my working processes and chance to deconstruct the image. This allows for something to 'go wrong with the connection', for when I reconstruct the shadows as flat sculptures, they appear to have form, but not always and not consistently. They are two-dimensional images of three-dimensionally impossible constructions.

In another experiment with 'impossible constructions', Escher plays with perspective; he shows how devices such as vanishing points are relative and that 'these concepts prove to be interchangeable' (Locher 1982: 144). He developed what he called 'curved lines of perspective', in which he manages to put many points of perspective on one sheet of paper in a seemingly coherent image. In *Up and Down* (1947: Fig. 35) the play with perspective results in an image that is also 'quasi-spatial'.

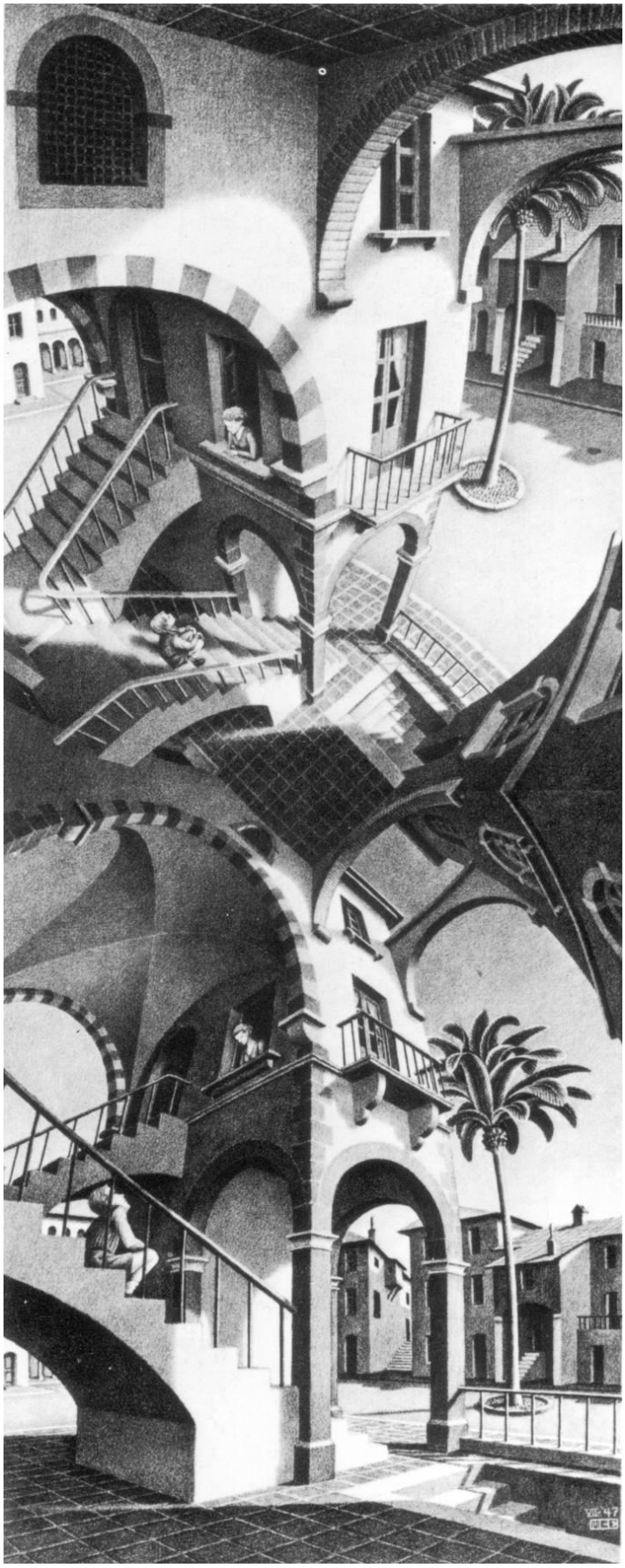


Figure 35. M.C.Escher. *Up and Down*. July 1947. Lithograph in brown 503 x 205 mm

In producing a single continuous picture from three different perspectives, he has problematised space in making up, down, left, right, front and back all easily substituted and interchanged arbitrarily. He creates a space that is completely convoluted and complicated, yet visually appears normal at first. Similarly, in my work I have rendered the *perceptual/conceptual* distinctions between sculpture and shadow (and, hence, the idea of the two- and three- dimensional space they occupy) interchangeable, convoluted and blurred.

Both my sculptural works and the graphic works of Escher seem to suggest that one's perception of space is not as stable and knowable as one thinks. The works hint at the possibility of things existing in a space that is neither tangible nor sometimes even conceivable. An image or sculpture will prompt contemplation of a 'quasi-space', another space, an impossible space where things are not bound to one's understanding of them – a space not bound to the two and three dimensions of one's perception.

The *idea* of things existing in a space 'in-between' dimensions is not altogether far-fetched. Mathematically, these spaces exist; they are called fractals. A fractal is a rough or fragmented curve or geometric figure that can be split into parts, each of which has the same statistical character as the whole. In other words, they have the property of self-similarity[24], where each part is a reduced-size copy of the whole.[25] Mathematically, the equation for a fractal is undergoing iteration (a form of feedback and repetition). 'Fractals are aggregates whose number of dimensions is fractional rather than whole, or else whole but with continuous variation in detection' (Deleuze & Guattari 2004: 537). A fractal's space rarely exists on a dimension of traditional Euclidean geometrics, such as one dimension (line), two dimensions (surface) or three

[24] 'In a way the word self-similarity needs no explanation, and at this point we merely give an example of a natural structure with that property, a cauliflower. It is not a classical mathematical fractal, but here the meaning of self-similarity is readily revealed without any math. The cauliflower head contains branches or parts, which when removed and compared with the whole are very much the same, only smaller. These clusters again can be decomposed into smaller clusters, which again look very similar to the whole as well as to the first generation branches. This self-similarity carries through for about three to four stages. After that the structures are too small for a further dissection. In a mathematical idealization the self-similarity property of a fractal may be continued through infinitely many stages' (Peitgen, Jurgens, & Saupe 1992: 65).

[25] 'fractal *noun*' *The Oxford Dictionary of English* (revised edition). Ed. Catherine Soanes and Angus Stevenson. Oxford University Press, 2005. *Oxford Reference Online.* Oxford University Press. Rhodes University Library. 12 February 2010 http://www.oxfordreference.com/views/ENTRY.html?subview=Main&entry=t140.e29288

dimensions (volume).[26] Their space is a fraction, fractured or broken. There are a number of fractals that have a dimension greater than one but less than two, more than a line but less than a surface.[27]

There are also fractals with a dimension of greater than two but less than three. I would like to concentrate on a particular fractal with the dimension of 2.7268: the Menger sponge (Fig. 36).

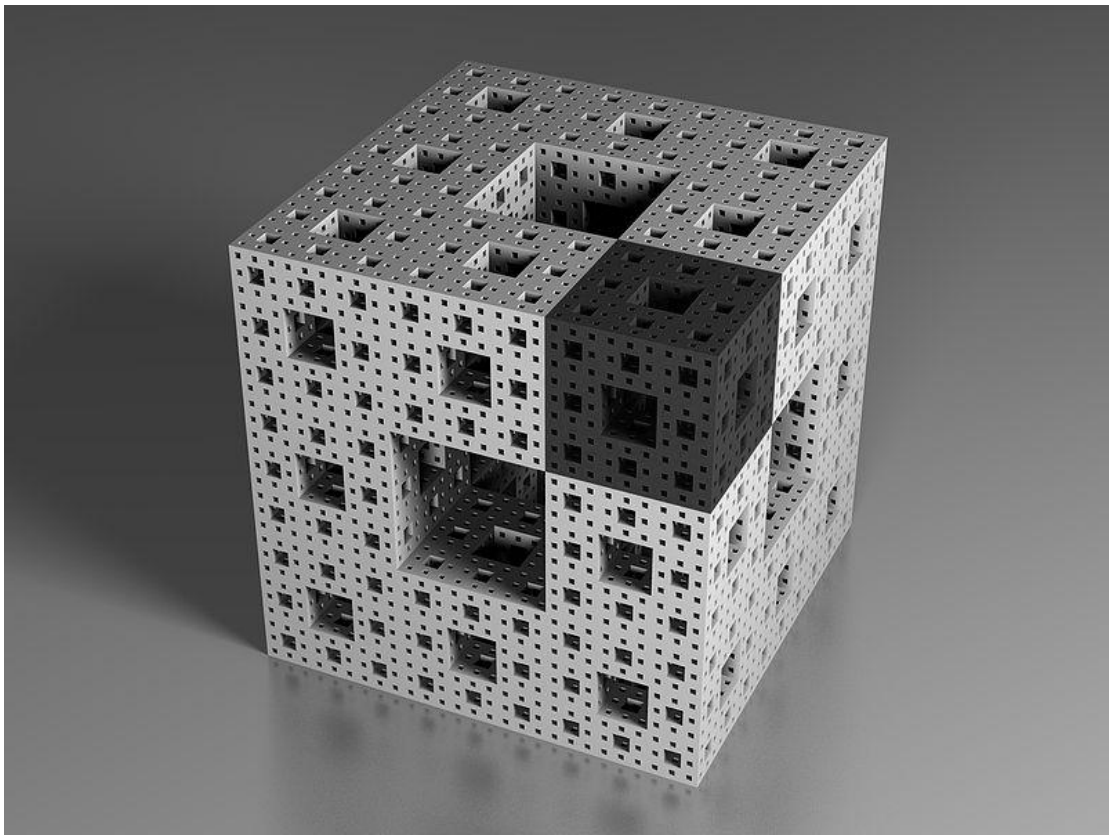


Figure 36. Computer generated image of a Menger sponge, showing how each part looks like the whole.

[26] To explain Euclidean geometries further: 'A point has dimension 0. Then a line has dimension 1, because it can be split into two points by a point (which has dimension 0). A square has dimension 2, because it can be split into two parts by a line (which has dimension 1). A cube has dimension 3, because it can be split into two parts by a square (which has dimension 2)' (Peitgen, Jurgens, & Saupe 1992: 107).

[27] 'Von Koch's curve: more than a line, less than a surface[: t]he end result is a "curve" composed of an infinite number of angled points that preclude any tangent being drawn to any of their points. The length of the curve is infinite and its dimension is higher than one: it represents space of 1.261859 dimensions (log4/log3 exactly)' (Deleuze & Guattari 2004: 538).

In this thesis I have explored artworks that suggest an in-between space; the Menger sponge, having a dimension of 2.7268, is mathematically an 'object' with neither a surface nor a volume; *mathematically* it exists in a dimension in between two and three dimensions. The construction of a Menger sponge can be visualised as follows:

> Take a cube [Fig. 37: block 1], subdivide its faces into nine congruent squares and drill holes…from each central square to the opposite central square (the cross-section of the hole must be a square) [Fig. 37: block 2]. Then subdivide the remaining eight little squares on each face into nine smaller squares and drill holes again from each of the central little squares to their opposite ones [Fig. 37: block 3], and so on [Fig. 37: block 4] (Peitgen, Jurgens, & Saupe 1992: 108).

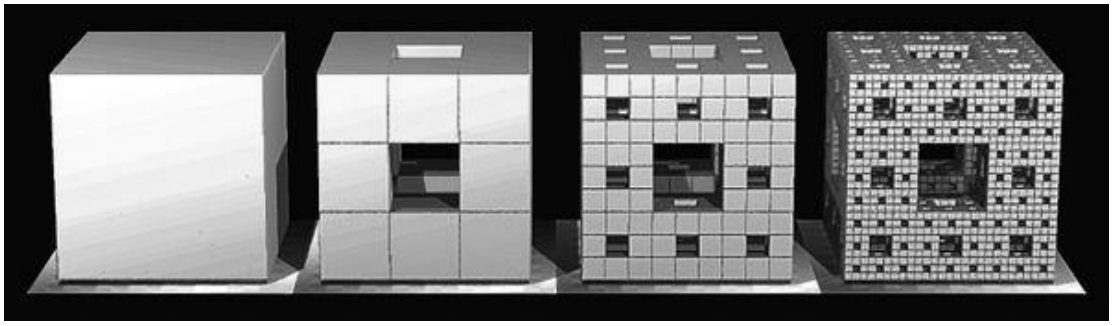


Figure 37. Illustrating showing the development of a Menger sponge.

This process of iteration (repetition) can go on *ad infinitum* making the cube infinitely hollow. 'Its total volume approaches zero, while the total lateral surface of the hollowings infinitely grows…It therefore lies between a surface (with a dimension of 2) and a volume (with a dimension of 3)' (Deleuze and Guattari 2004: 538). It has a fractal number of dimensions greater than 2 and a fractal number of dimensions less than 3.

I have introduced the Menger sponge because it is an interesting *conceptual illustration* of this idea of 'non-space', or at least of a space inaccessible to our perception. The Menger Sponge is an 'impossible construction'. Any pictorial (two-dimensional) representation (Figs. 36 - 39) of it will not have enough surface as the representation of the sponge will be bound to the two dimensions of the plane.

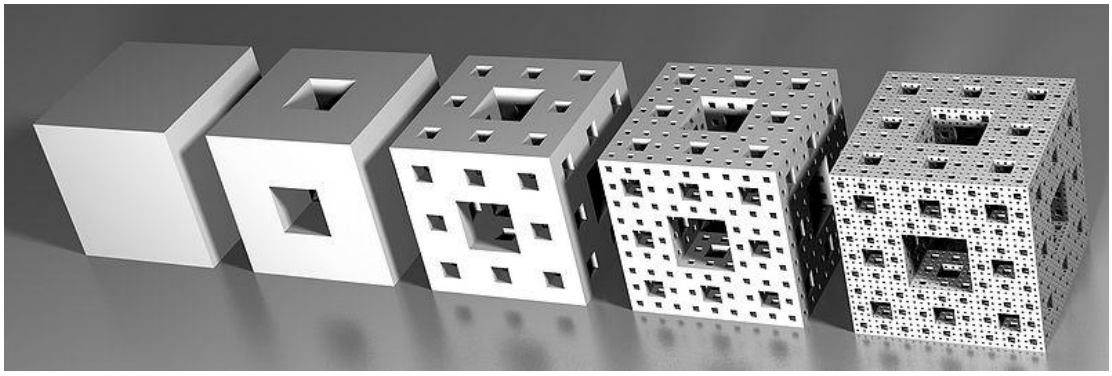


Figure 38. Computer generated, 2D image showing the development of a Menger Sponge.

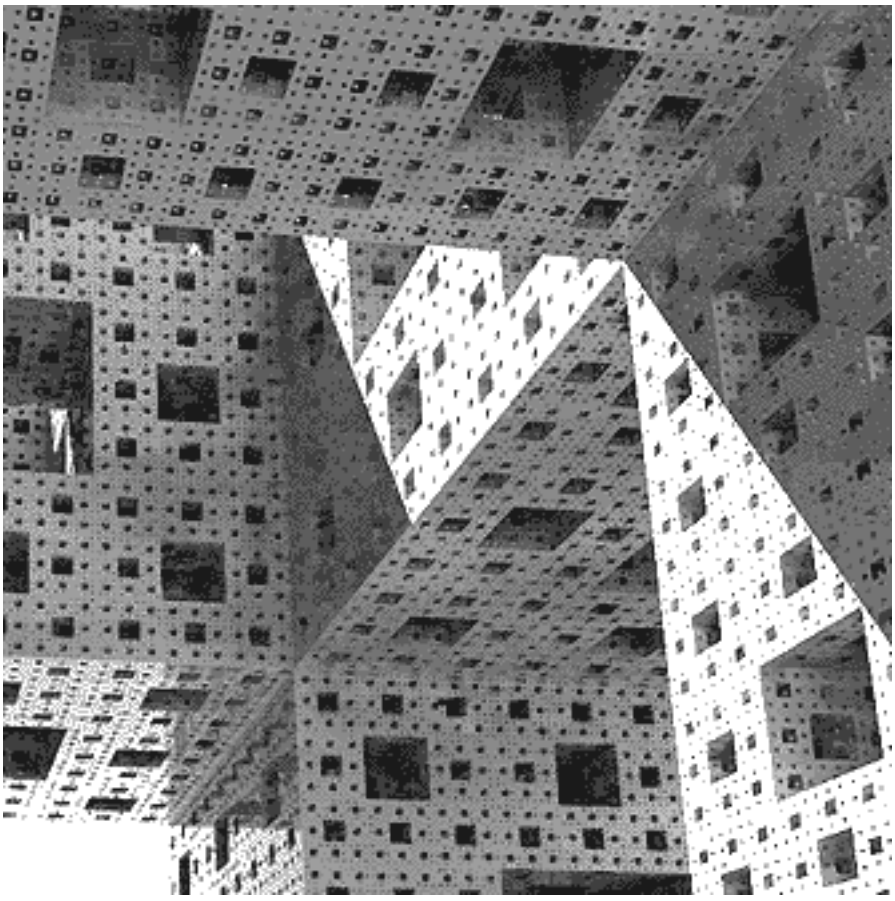


Figure 39. Computer generated image of a Menger sponge, view from the inside.

Any sculptural (three-dimensional) representation (Fig. 40) will have too much volume as the three dimensionality of a sculpture exceeds the dimensions of the Menger sponge.

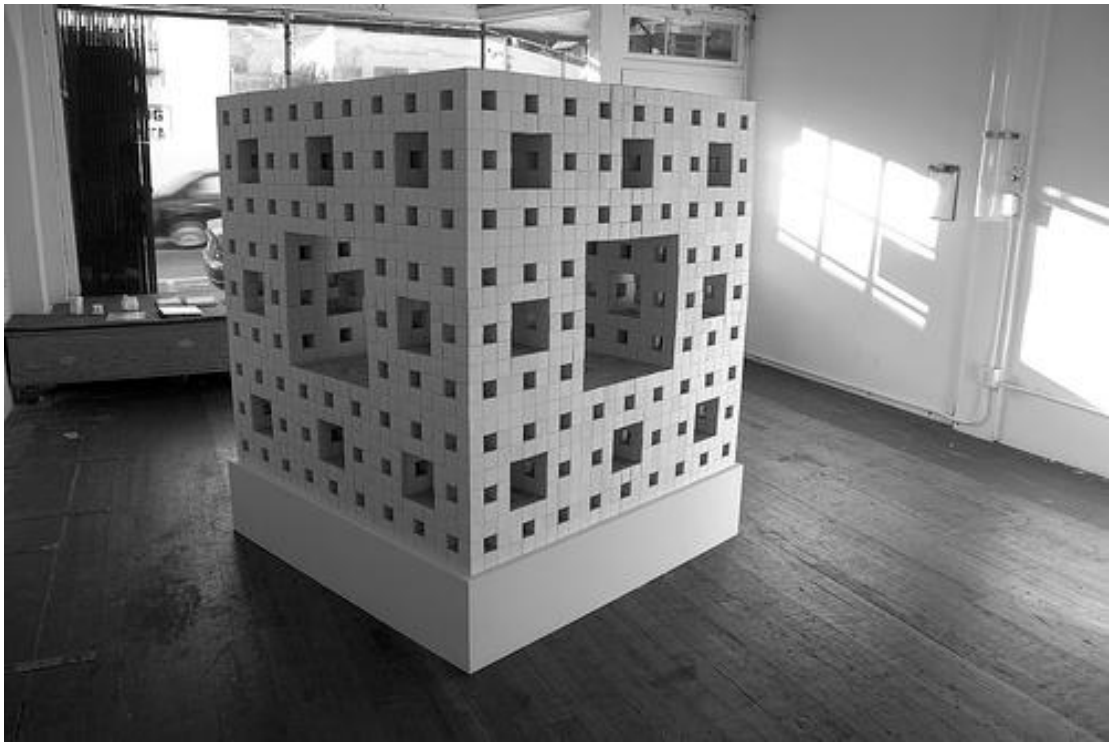


Figure 40. Jeannine Mosely, *Menger sponge*, folded business cards, (Photograph taken by Ravi Apte, The Institute for Figuring.

It is un-representable with the dimension of 2.7268. It is a fractional 'object' that represents infinity and infinite repetition within a finite space. This cannot be perceived as a physical manifestation as our perception is bound to two and three dimensions. It is an infinite 'becoming', rather than a 'being', of a volume; a 'quasi-space', an 'impossible construction'. A representation of the Menger sponge can only exist within one's imagination.

Locher explains that Escher was driven to uncover something of the reality of space but 'which in the end confronts us with the limitations of our senses and particularly with the limitations of our eyes…[a] unique interplay between insight and limitation, between possible and impossible worlds' (Locher 2000: 19). The initial impetus for my sculptural works was a man-sized seahorse in my bed, a dream-vision, something of the imagination. The question is, then: can things of the imagination be represented? As seen in the Menger sponge and Escher's 'impossible constructions'

there are objects that simply exceed our limits of representation and perception. My works certainly occupy the space we inhabit, according to a conventional understanding of space, but they make one think about other spaces, non-spaces, space that is in-between, that oscillates, that does not pin itself down and become fixed to any particular image, idea, object or representation. Moreover, the Menger sponge suggests that some things by nature, are in a constant state of process. 'When we think about fractals as images, forms or structures we usually perceive them as static objects' (Peitgen, Jurgens, & Saupe 1992: 1), when in fact they are dynamic, always in process – moving towards the infinite within the finite limits of its form.

CONCLUSION

My work seems to speak about two things in particular and these are main threads running throughout this thesis. It is quite simply about a seahorse, but also about a mapping of space – the physical space of artworks and the conceptual space of representation. It seems that there are some things that cannot be represented, that defy occupying space and, even if they do, seem to occupy more or less space than what is perceived. My work is neither figurative nor abstract, two-dimensional nor three dimensional, diagrammatic nor volumetric. This can be mirrored, turned around and still mean the same thing: my work is both diagrammatic *and* volumetric, figurative *and* non-figurative, two *and* three-dimensional. Either way it seems to occupy a non-space. It is neither black nor white but grey, occupying a space that, at least in one's conception and perception of it, never settles on a fixed axis of orientation. Instead, the works slide around in the grey areas in between binaries and conclusive definitions; a fixed meaning is continually undermined by both intention and process.

On speaking about space, Deleuze suggests that 'a given image or concept, when it is seen or engaged, creates and dissipates space in the time of its perception' (Parr 2005: 257). He calls the apprehension of space an 'exhaustion of meaning', and states that 'the artist dissipates meaning in order to make space palpable at the moment it is both created and annihilated' (Parr 2005: 257). Composition is always a mixture of the creation and annihilation, construction and deconstruction. There are no dualities or binaries but instead a supple system, a process, a becoming.

I will conclude three times over, each time picking up different threads that have run through the thesis, each time the same thing but different – a repetition, perhaps, but a becoming of a conclusion, a process of ending.

Conclusion 1: Towards a Representation

There are two elements that I have continually featured throughout the thesis that I feel enable on both a *physical* and *conceptual* level the idea of a space not bound to

representation. These are the structure and line of the *diagrammatic* and the notion of *infinity*.

Diagram

The word 'diagram' is usually akin with the idea of a line drawing. My sculptures are like diagrams drawn in the air, on the ground and in space. A diagram can be many things but, generally, diagrams are both constructive and dissolutive agents. The diagram is a sketch of something that could be and is yet to come – a working drawing, a plan, a map, 'a schematic vehicle for rapid recognition' (Fer 2004: 65). It is the first step towards an elaboration of something. Conversely, one can simplify a complex structure into a diagram, which becomes a means with which to explain and make sense of things, 'an abbreviation, retaining only what [is] strictly necessary' (Fer 2004: 65). The diagrammatic nature of my work is both and neither of these definitions. It is a becoming out of nothing, a sketch, a plan and also an attempt to understand what is already there. Neither process precedes the other but instead there is a simultaneous working and reworking, elaboration and simplification of the image of a seahorse.

Deleuze speaks of the diagram as that which allows the *figural* to emerge, explaining that there are two dangerous positions on either side of the figural middle way. The first is figuration/the figurative – narration and illustration, representation. The second is the absolute deterritorialisation of the figure – absolute abstraction. In Escher's 'regular division of the plane' prints (1957: Fig. 31), each individual image is separated from the one adjacent to it by a thin dividing *line*. This middle line belongs to both images but never both at the same time. In a sense, the images oscillate in the middle between pattern and figure, between the abstract and the figurative. Deleuze uses the work processes of Francis Bacon[28] to explain how the *figural* emerges through the diagram:

> The law of the diagram, according to Bacon, is this: he starts with a figurative form, a diagram intervenes and scrambles it, and a form of a completely different nature emerges from the diagram, which is called the Figure (O'Sullivan 2007: 62).

[28] I introduce Francis Bacon here not with aim of elaborating on any particular artworks but merely as a means with which to qualify Deleuze's *figural*.

Resemblance is achieved through non-resembling means. He speaks of the quality of Bacon's line as being 'like the emergence of another world…They are non-representative, non-illustrative, and non-narrative. No longer are they significative or signifying: they are asignifying features' (Ednie-Brown 2000: 1). Qualified by O'Sullivan (2007: 62), 'the diagram is…the operative set of asignifying and non-representative lines and zones'.

Deleuze's diagram enables a becoming of a figure without attachment to the figurative, a narrative or meaning and without the complete dissolution of the figure through abstraction. The diagram is 'a chaos', 'a catastrophe, but it is also a germ of order or rhythm. It is a violent chaos in relation to the figurative givens' (O'Sullivan 2007: 62). The operation of the diagram according to Bacon is to '"suggest", or more rigorously, it is the introduction of "possibilities of fact"' (Ednie-Brown 2000: 9), rather than to *be* fact/image/concept.

The diagram, then, enables the emergence of a form of expression that 'presents' that which cannot be represented. As Bacon said:

> Images do drop in, constantly, but to crystallise these phantoms that drop into your mind is another thing. A phantom and an image are two totally different things (Ednie-Brown 2000: 1).

The man-sized seahorse in my bed, in all its obscurity and dream-like reality is synonymous with Bacon's 'phantom', that 'dropped into' my mind and that cannot necessarily be crystallised. The diagram as a means of expression is enabling in its process; a continual construction and dissolution, towards and away from an image. Diagrams are created, produced, and developed through action and repetition.

This process, the seahorse-process, is a drawing/sketching/mapping of space, a diagrammatic mind map of a subject in the process of finding its meaning. As Fer (2004: 80) said: 'far from "impersonal", the violent indifference of…[diagramming] ends up not neutralising the subject but redefining what subjective relations might feel like under new conditions.' The diagram is, and enables, a play within space; it

suggests the 'figural "behind" the figure, the invisible "behind" the visible' (O'Sullivan 2007: 64).

Infinity

When speaking about space perception, O'Keefe and Nadel, quoting Kant, said that 'space is a way of perceiving and not a thing to be perceived' (O'Keefe & Nadel 1978: 19). Similarly, Deleuze's assertion that what is important is not what something *means*, but what it *does*. There is an emphasis here, and throughout this thesis, on process, movement and becoming. What greater becoming is there than the becoming of the infinite and, as we saw in an 'object' like the Menger sponge, an infinite becoming away from two- and towards three-dimensions? When speaking about how infinity breaks the bounds of a totality, in other words, does not *be* but *becomes*, Fer (2004: 58) said:

> The point is less what infinity is than the operation it names, an operation that is always uncertain about its object, that calls infinite what exceeds representation and so has to be abandoned. Infinity, after all, is not an object, but something that exists in the mind as that which is beyond representation.

Infinity is not a 'thing' – it is precisely what escapes being a thing. Humans can only imagine it, never experience it. It is a form of inflation and to inflate an idea in the imagination is to make it immense, immeasurable, invisible, intangible. Infinity exists in our imaginations (Fer 2004: 37). However, it is our nature to measure, define and understand. Schattschneider (2004: 241) explains that 'mathematicians and scientists capture infinity in formulations which describe and measure. Escher sought to capture infinity in visual images'. In 1959, in an essay, 'Oneindigheidsbenaderingen' ('Approaches to Infinity'), Escher wrote:

> Anyone who plunges into infinity, in both time and space, farther and farther without stopping, needs fixed points, mileposts as he flashes by, for otherwise his movement is indistinguishable from standing still. There must be stars past which he shoots, beacons by which he can measure the path he has traveled. He must mark off his universe into units of a certain length, into compartments which repeat one another in endless succession. Each time he crosses the border from one compartment to another, his clock ticks. Anyone who wants to create a universe on a two-dimensional surface (he is somewhat deluding

> himself because in our three-dimensional world there cannot exist a reality of two dimensions nor of four) notices that time passes while he is working on his creation. But when he has finished and inspects what he has done, he then sees something that is static and timeless: in his depiction no clock ticks; there is only a flat, motionless expanse (Schattschneider 2004: 241).

Conclusion 2: On a Map

In Chapter Two I proposed a more fluid way of thinking about the function of the hippocampus, where the terms hippocampus (brain structure), *Hippocampus* (scientific name for a seahorse) and seahorse (sea animal) become interchangeable and self-similar, and where a *seahorse* becomes nothing more or less than a *mapping of space*, and the *space being mapped* no more or less than a *seahorse*. Through looking at the functions of maps and specifically in relation to a 'concept tool' such as Deleuze's rhizome, I unpacked how maps, being built out of curiosity and experimentation, have not specific goal or end. They do not fix an order and define a structure, but instead are open and extendable. I have made an exhibition of lines, connecting, traversing, composing, and dissolving space; a mapping of space within space; a mapping of a seahorse within the structure of a seahorse. This exhibition can be seen as a representation of potentials. A fleeting shadow, drawn and sculpted, a passing vision held on to and extrapolated. My physical and mental processes are the mapping of movements, the experimentations, the detached, reversible, relational shifts between the sculptures themselves. In tracing the organised, stabilised, neutralised structures, I have attempted to secure or structure an image, a representation, the *being* in the *becoming*: 'out of one territory, one map, can bloom a thousand geographies' (Harmon 2004: 17).

Conclusion 3: In the Beginning

Near the beginning of my Masters when I started reading and thinking about chaos theory, fractal systems and optical illusions, I had very little idea of how a body of work could develop from these interests. One idea entertained was to make a four metre tall Menger Sponge that people could actually walk or crawl through. I let the idea go when I realised it would take me six years just to cut the 3.2 million 2cm blocks of wood required to make the sponge, before even beginning to construct it. When the elusive seahorse crept into my bed, I abandoned any previous ideas and

became acutely preoccupied with trying to understand this image and work with it. I had made a large number of works before I began reading specifically towards my thesis. In trying to contextualize my work, it has come as a pleasant surprise that I have gravitated back towards my initial interests. This was not an intentional or conscious movement, but as my research developed I realised that my exhibition had begun speaking about non-representation, repetitions, the balance between chaos and order, the illusions and perceptions that had initially intrigued me. It amuses me that in contextualizing my work, I stumbled across the Menger sponge again and it best helped me explicate a point: that some things just simply escape and defy representation.

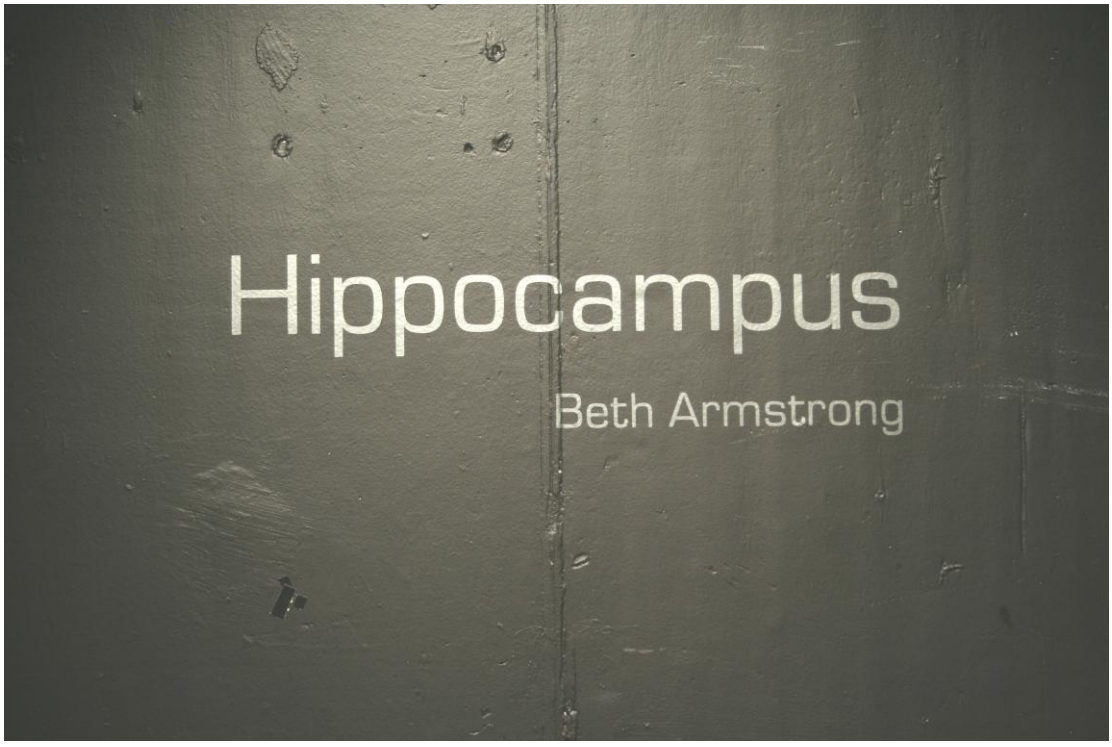
Escher is quoted saying:

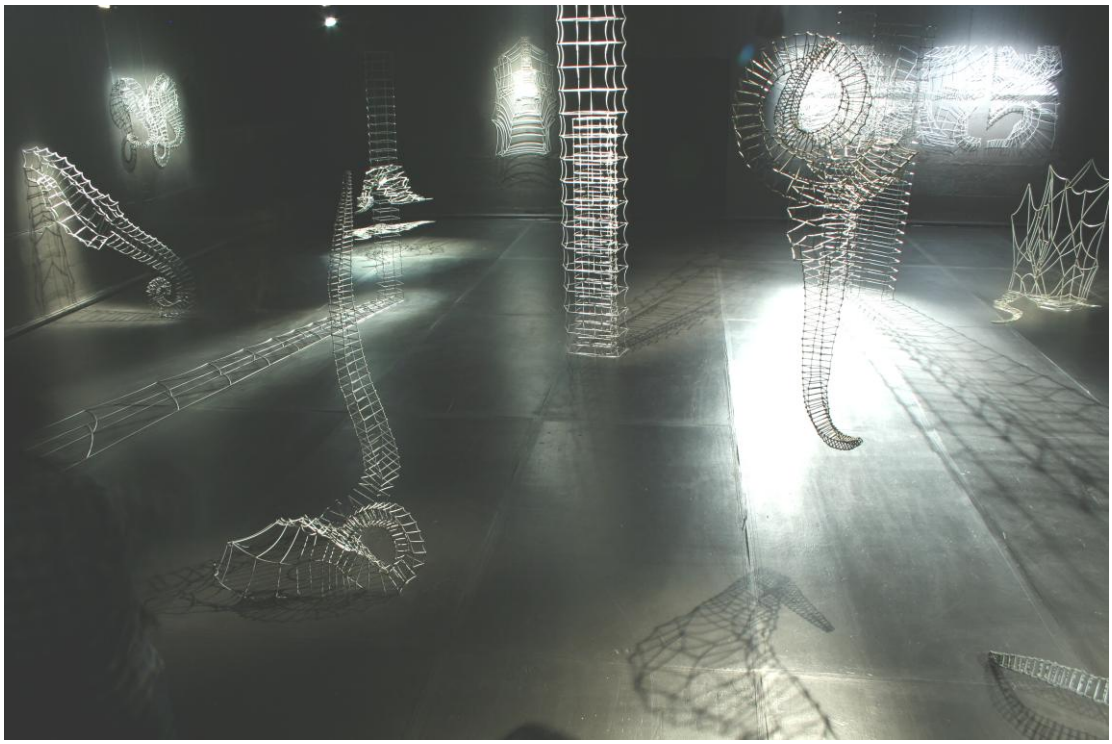
> I should be inclined to say, then, that none of us needs to doubt the existence of an unreal, subjective space. But I for one am not sure of the existence of a real, objective space. Our senses only reveal a subjective world; we may not think, and possibly believe, that we can conclude an objective world exists (Locher 1982: 68).

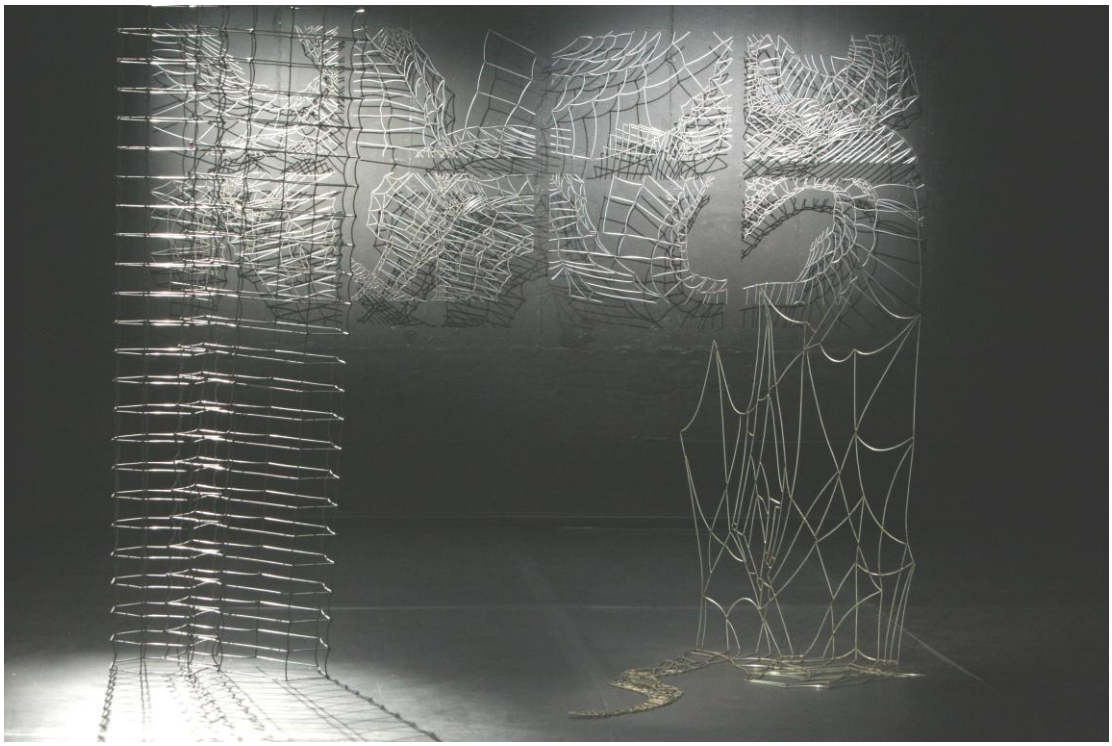
I began a body of sculptural work with intent to describe an image; to capture its form; to make visible the invisible; to get the man-sized seahorse out of my bed. But in my attempt at grasping or pinning down this ever evasive form I have moved into the slippage that is the apprehension of meaning, the slipperiness of dreams, perception and understanding. Every moment he is created his meaning is annihilated and he slips away, only to try again. He pushes and pulls in space. He rolls around, inverts, dissolves, creating and collapsing continually; collapsing as he is being created; a shadow on a page; a piece of wire on a wall.

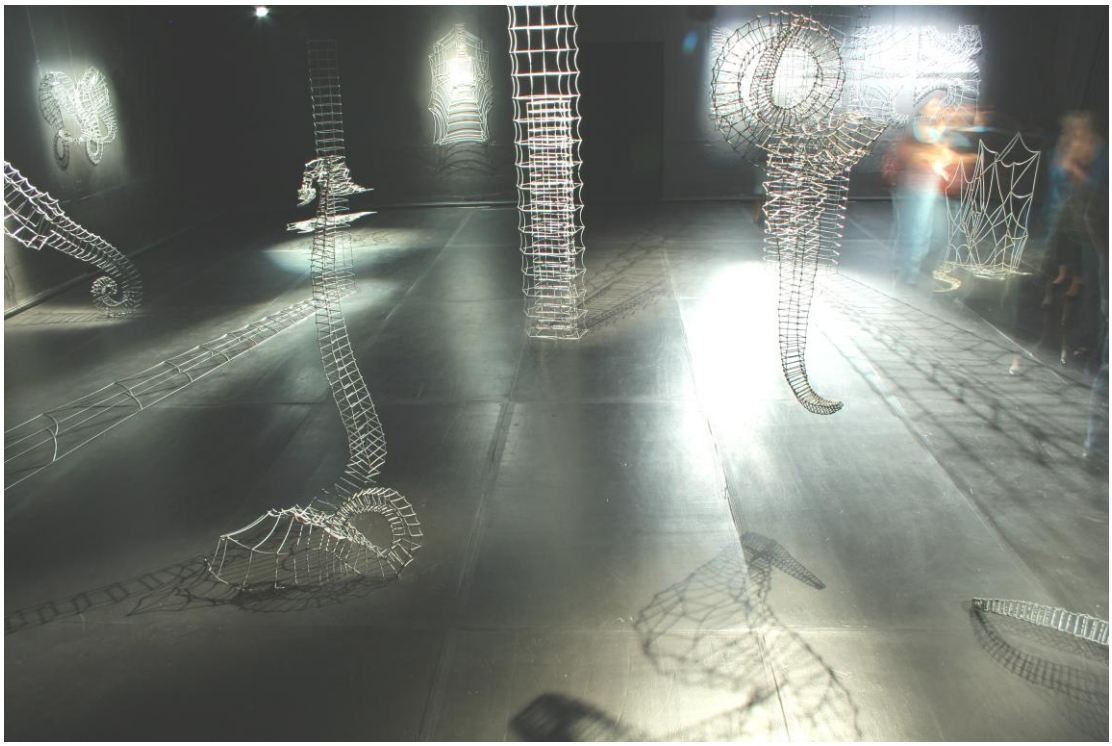
APPENDIX A

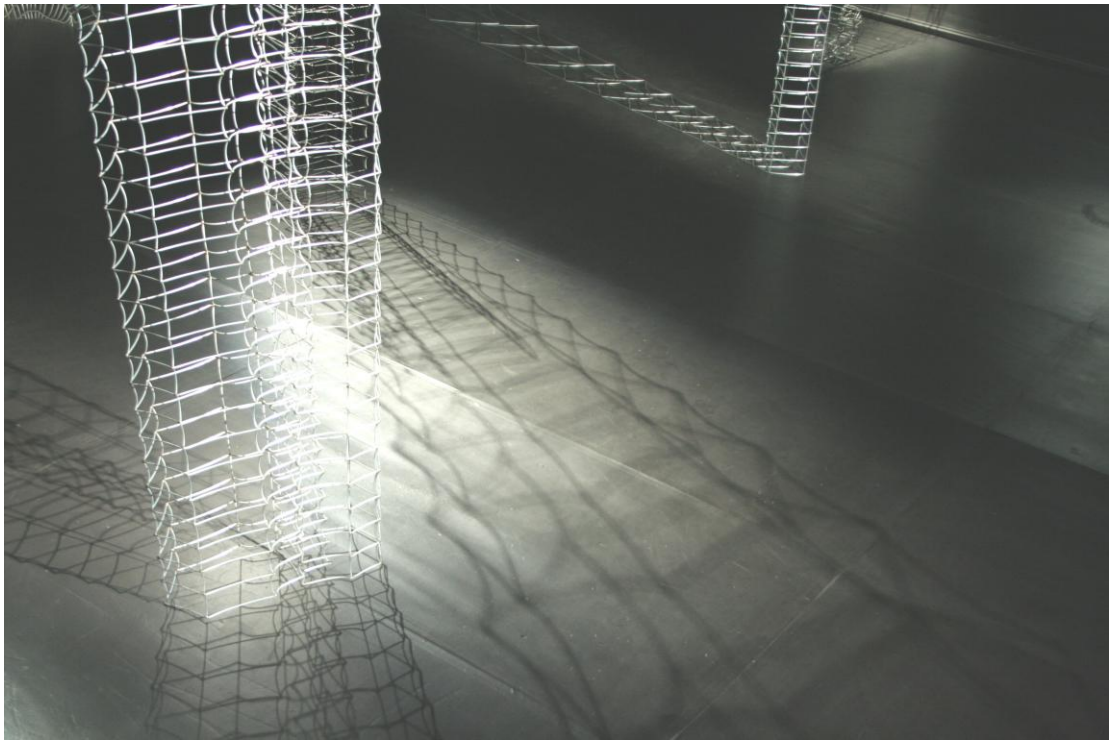
EXHIBITION INSTALLATION IMAGES

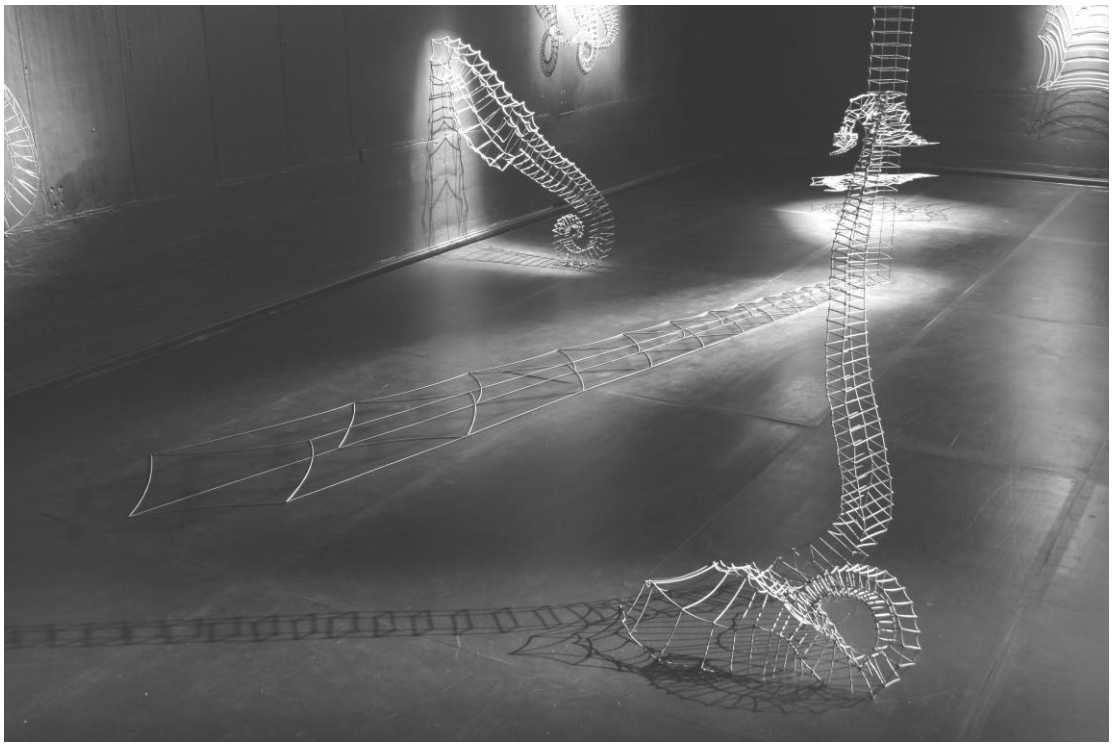


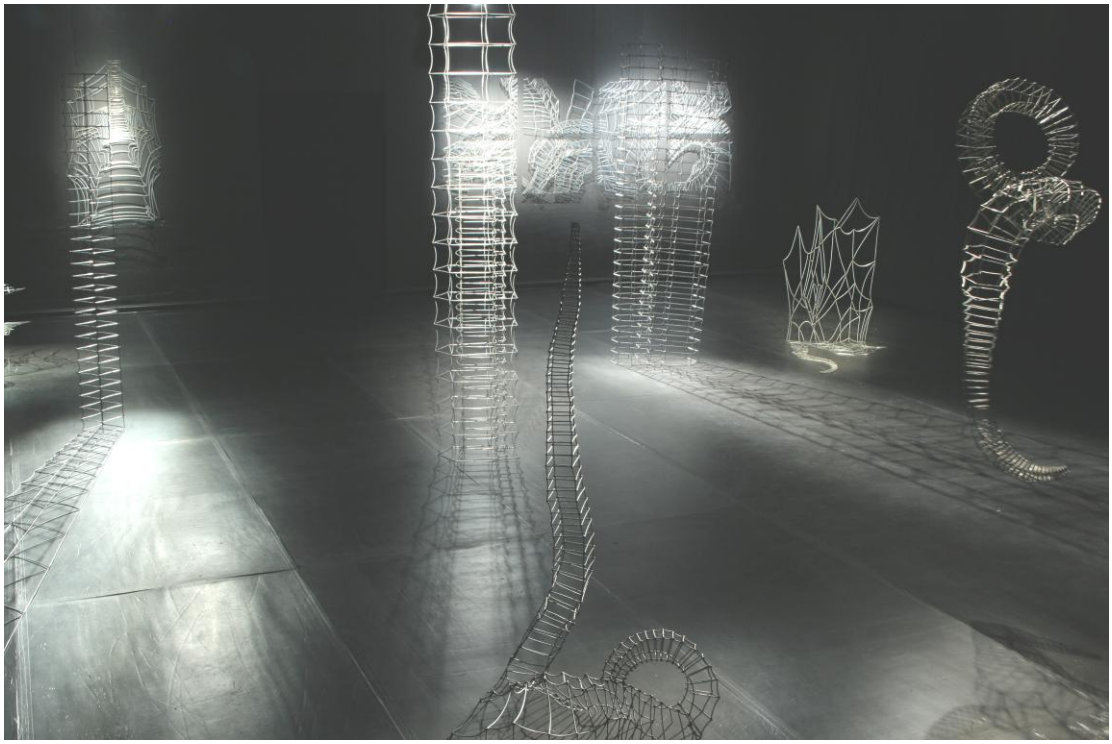


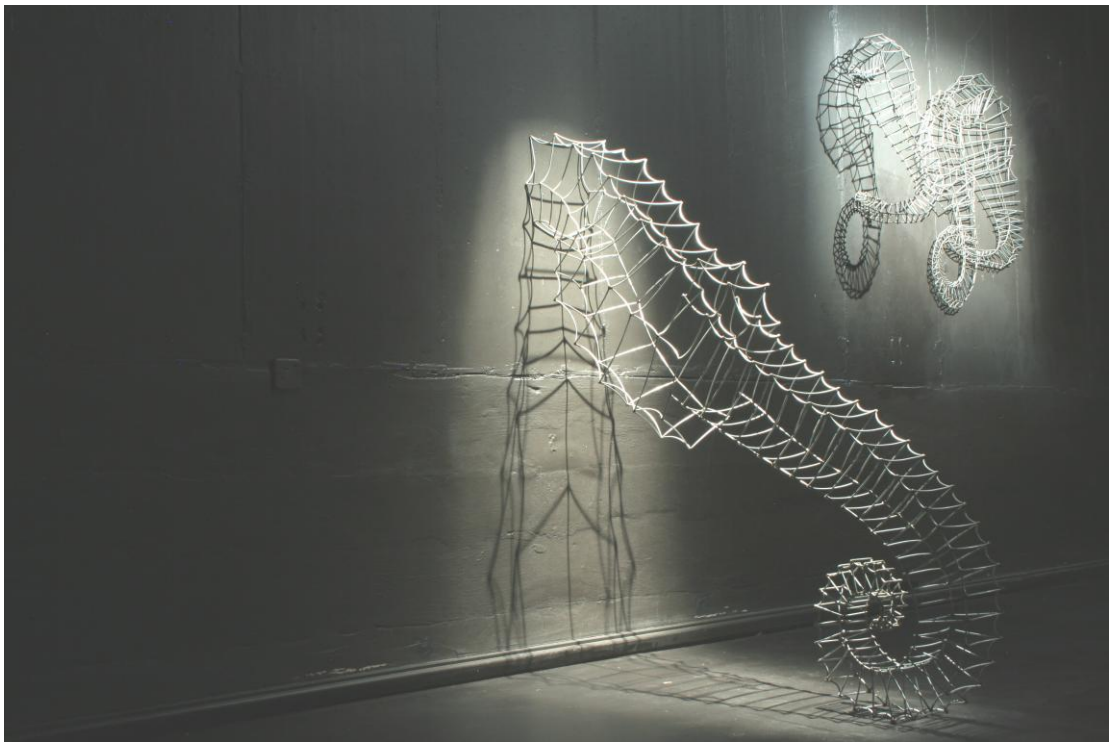


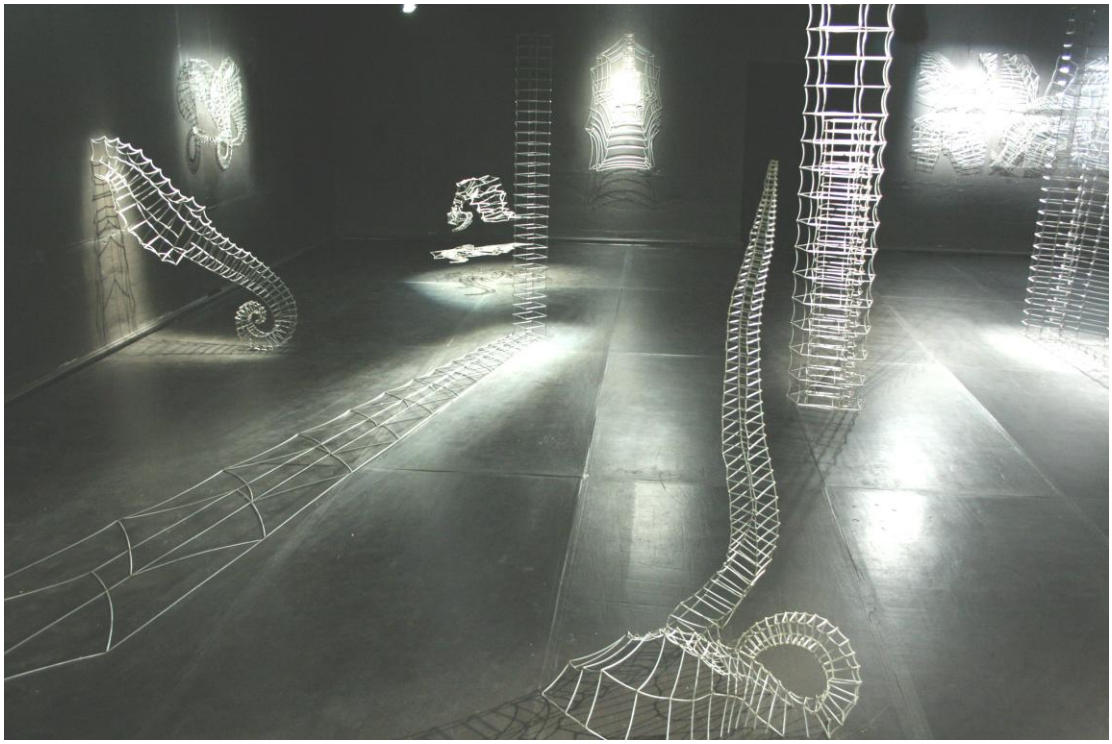


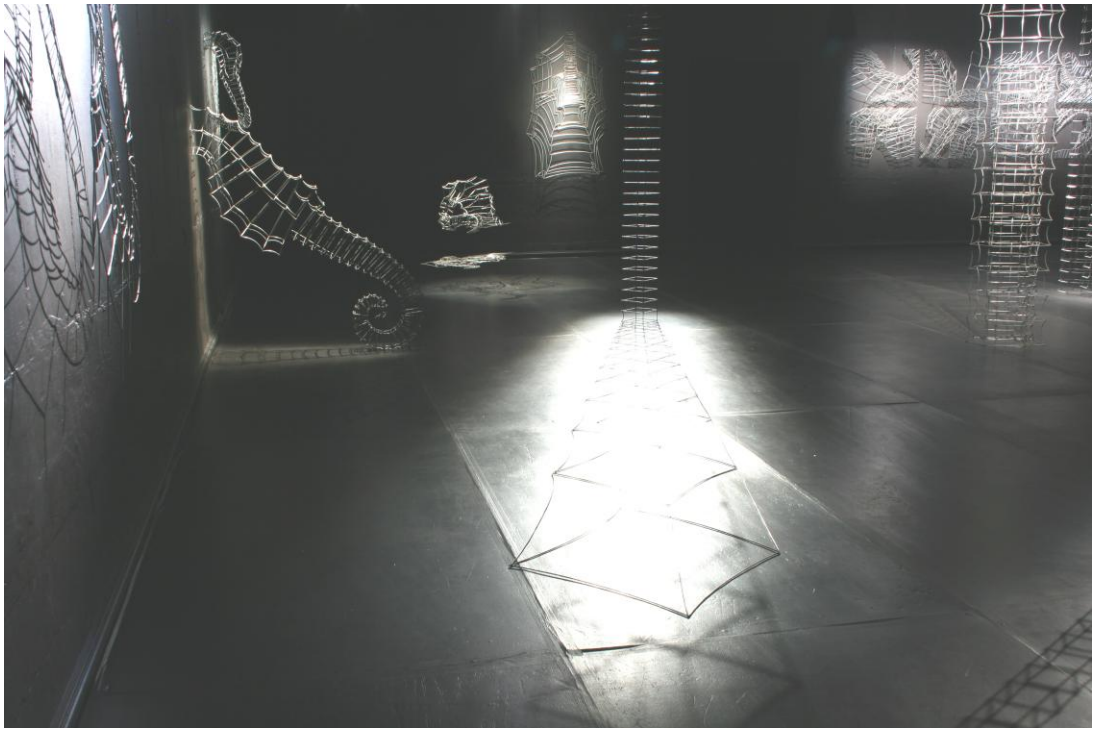


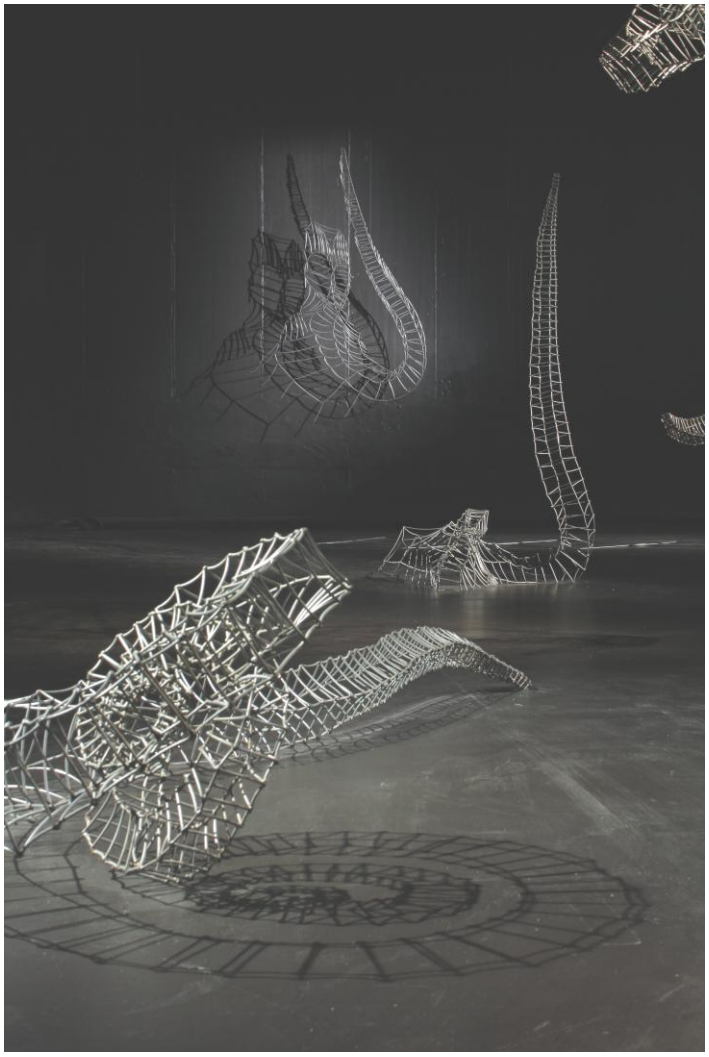












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