DYNAMIC CUTTING
How tacit knowledge of material creativity and spatial creativity can be activated using metaphor in fashion design practice.

A project submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

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July 2018
I certify that except where due acknowledgement has been made, the work is that of the
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been carried out since the official commencement date of the approved research program;
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procedures and guidelines have been followed.

I acknowledge the support I have received for my research through the provision of an
Australian Government Research Training Program Scholarship.

Donna Sgro
10 July 2018
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ACKNOWLEDGEMENTS

I wish to thank the following people for their encouragement and support throughout the project:

My supervisors, Dr Scott Mayson and Professor Robyn Healy for their valuable feedback, time and patience on this journey.

My colleagues at the University of Technology Sydney, for their ongoing support. Special thanks to Professor Lawrence Wallen, Professor Thea Brejzek, Cecilia Heffer, Dr Cathy Lockhard, the Interdisciplinary Design and Fashion & Textile Design program teams.

To the RMIT Practice Research Symposium, for the opportunities to present and discuss my work with other creative practitioners and to develop new friendships through this. To the participants of my in-progress reviews and panels, whose feedback was indispensable to the project development.

To my collaborators, Armando Chant, Olivier Solente, Lin Wei and Sarah Vosper. Thanks also to Fiona Wright and Praveen, Saroj and the rest of the wonderful ladies of The Stitching Project.

Special thanks to Tania Splawa-Neyman for copy editing, and friendship.

To Dr Zoe Sadokierski, Ilka Staudinger and Monica Monin for graphic design input of this final document design.

Most of all, I wish to thank my family and friends for their unwavering support and encouragement. Piero and Pepito you guys are my rock. Amber my lady rock. Elka, Dave, Rob, Penny, Tiera, Chelsea, Dani, Denise, Nick, Siena, Ynes, Jacinta, David, Ivy, Ben, Di, Tighe and Peach.
ABSTRACT

This Ph.D. research by project takes place in an existing fashion design practice that involves the design and pattern cutting of garments and textiles. The development of professional skills in fashion design in the commercial sphere, in time became tacit knowing formed through repetition of habitual hand-based activities. In this practice design was separated from pattern cutting which impacted creativity in the cut of garments. To challenge habits in practice, a metaphoric strategy was used to adapt new methods for design from a study of butterfly metamorphosis.

Fashion design can be led by pattern cutting, however, conventional practice still emphasises the separation of cutting from design, formed through industrial practice. Values of efficiency and repetition continue to influence how pattern cutting is explored and applied in practice. To evidence a greater awareness of diversity in pattern cutting, as it is applied in practice, requires a larger contribution by individual fashion designers and pattern cutters to develop this area of practice and research. Methods for experimental pattern cutting are rarely shared or developed beyond individual studio environments.

In this research I develop strategies for increasing material creativity and spatial creativity through pattern cutting by attuning more closely to tacit knowledge formed through material and spatial engagement. Metaphors enable me to better reflect on this knowledge and make it more explicit, while evolving new lines of experimentation through pattern cutting. As a result of expanding this experimentation I develop a new experimental method of cutting garments called Dynamic Cutting. This method involves designing the surface and form of garments simultaneously and questioning the very notion of patterns as templates.
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Preface

On habits
habit (n.)
a garment or an outward form of appearance
a tendency to act in a certain way, especially through repeated activities or customary acts
[Abridged definition from the Shorter Oxford English Dictionary, 2007]
Habitual fashion design practice

I am in the middle of producing a new range of sample garments for my upcoming Autumn/Winter (A/W) 2009/10 collection, Octopus’s Garden. I am using the wall in my studio upon which I have pinned up all of my design plans for this collection, including the collection of garment designs. I am working progressively through these each day, using each to create new patterns, then cut toiles, then construct, then fit, then alter, then create sample garments. I am making my way through 35 or so individual garment styles. Figure 2 represents the process of design and sample making.

I have a number of systems in place that I use to track my progress. This is a complex undertaking to keep abreast of. I try to keep a system so I can effectively manage the entire process with all its details. I need to know which garments I need to start making patterns and toiles for, which garments I have already made patterns and toiles for, which garments I have fit, how exactly I need to change different patterns, if I need to recut and remake new toiles, and which need refitting before final sampling. I need to then work out exactly what fabrics, trims, processes and preparations are necessary for each sample garment to be produced, ensuring I have all the materials to hand, ready to go.

Figure 2  Design and sample making process.

Figure 3  Octopus’s Garden A/W 2009/10, range drawing.
To make my daily practice in this process easier to manage, I split my activities in the day to maximise my efficiency to produce on time. I only have four or five weeks to produce the entire sampled range. I plan out at the beginning of the sampling process what garments I will produce weekly and how each week in the sampling period contributes towards the completion of the full collection. Each Monday I sit down with this schedule, reassess my progress from the week past, and use this to adapt my schedule for the next week. Sometimes I run out of time. Often, I have to make adjustments as I go.

Daily practice is regular and repetitive during the sampling process, and it is fast. Sometimes I have interns who come in to the studio to assist me and sometimes I have a sample machinist. However, most of the time I undertake the work myself. In the mornings I spend my time pattern cutting, as I know through experience that is the most effective time in the day I can do this with my full attention and fresh energy. During the middle of the day, to have a break from this manual work, I attend to ongoing business activities, mostly computer work. Sometimes when I need to visit a supplier or a maker, I do it in this time. This is especially the case when I need to take my fabric for fusing, or samples for finishing. In the afternoon, I start cutting toiles and sample garments that need to be made up. Usually I will cut more than one garment at any one time. If I have multiple garments in the same cloth, for example, it is more efficient if I cut them together. Sometimes I need to cut multiple fabrics for each garment, including the main fabric, the block fused fabric, a contrast fabric, and a lining, for example. These are all bundled together, tied into separate garment piles to be used for sample and toile making.

Later in the afternoon, usually by 4pm, I start making toiles and samples that need to be fitted. I will continue working on these until they are complete or when I finalize work for the day. Following the creation of new toiles or samples, I organize for my fit model to come in for a fitting session. Assessing the garments made in the last few days, I pin, draw, tape and cut them as necessary for alterations. These changes are then marked up onto the existing patterns, which are modified or redrafted. Some sample garments in this process require minimal alterations, while others are extensive. Sometimes I produce iterated versions of the same patterns and toiles 4, 5 or 6 times.

I am at the end of the sampling process for *Octopus’s Garden* A/W 2009/10, my second last full sampled collection produced in my business. For this sample collection I produced 39 styles in multiple colourways and in multiple units, perhaps 190 garments in a total of six weeks. Phew! This is how habits in my practice formed which separated designing from pattern cutting, and the experience I stepped from, into this Ph.D.
Definition of terms

This section includes a list of fashion design technical terms that describes and identifies how I use them in my practice. These definitions emerged from reflecting upon how I use each in my practice, and are, therefore, my own definitions as they relate to my practice.

Alteration
Any changes made to a pattern or toile after fitting.

Colourway
Different colour variations in which the samples are available.

Construct
The act of sewing separate pieces of fabric together that form the components of a garment. I use an industrial sewing machine for this purpose.

Finishing
Any technique used on sample garments that requires specialised equipment. For example, button holes, neck binding.

Fit model
A person whose size, shape and proportions aligns with a standard size. I sourced fit models to align with my label's size 10 (Aus).

Fitting
The assessment of a garment on a live model for how it looks, moves and feels, including measurements and proportions. This is carried out through physical and verbal communication with a fit model.

Fusing
A secondary material support used to strengthen or otherwise reinforce the qualities of a fabric. In my practice I use fusible interfacing. This is a sticky backed fabric that needs to be pressed onto the primary fabric through a heat machine for proper adhesion.

Garment
A single piece of clothing.

Paper Net
Paper nets are commonly used in paper engineering and in packaging design. They represent three-dimensional forms which have been flattened into their component shapes, joined by dotted lines to indicate where they will fold to become solids.

Pattern
A template for the component parts that make up a garment made in paper or cardboard that is used to cut fabric.

Pattern cutting
A process used to draft a template for a garment on paper, using body measurements and drafting principles. In Australia this practice is generally referred to as patternmaking. I prefer to use the term pattern cutting.

Seam
A join in two pieces of fabric. There are a variety of seam types that I use for different purposes. Plain seam refers to simplest type of fabric join that has been stitched once. French seam refers to a fabric join that has been stitched twice. First a narrow line of stitching joins the two pieces together, resulting in a small seam allowance. Then this seam is inverted and stitched again from the other side, encasing the original raw edges.

Seam Allowance
A small, additional measure of fabric, added to pattern edges so they can be sewn together.

Sample
A garment that is used for sales purposes, made up in the intended materials, used to procure future sales and drive quantity production.

Toile
A mock-up or prototype garment, usually in calico or a less expensive fabric that is similar to the intended sample fabric.
Chapter 1

INTRODUCTION

Experimental pattern cutting in fashion design practice
metaphor (n.)
Latin metaphor from Greek metaphorien transfer
1. A figure of speech in which a name or descriptive word or phrase is transferred to an object or action different from, but analogous to, that to which it is literally applicable; an instance of this, a metaphorical expression.
2. A thing considered as representative of some other thing; a symbol.

metamorphosis (n.)
From Greek metamorphosis, from metamorphoun transform
1. The action or process of changing in form, shape, or substance.
   a. A metamorphosed form
2. A complete change in appearance, circumstances, condition or character.
3. Biology: Normal change of form of a living organism, part, or tissue; spec. the transformation that some animals undergo in the course of becoming adult (e.g. from pupa to adult insect) in which there is a complete alteration of form and habitat.

[Shorter Oxford English Dictionary 2007]

1.1 Research topic

This Ph.D. research by project investigates the practice of fashion design through experimental pattern cutting. There is limited representation and discussion of how experimentation is developed and applied in pattern cutting from the perspective of individual fashion designers and their tacit knowledge. It is from this viewpoint that my creative practice research makes a contribution to the field of research in creative pattern cutting. Through the articulation of experimental pattern cutting practice, I introduce the terms material creativity and spatial creativity to make explicit how experimentation occurs through my pattern cutting practice, using tacit knowledge. Experimental pattern cutting is defined in this research, as exploratory cutting activities that contribute towards the development of new garment shapes or forming techniques other than those practised through repeating known conventions. The meaning of experiment in the context of my experimental pattern cutting practice aligns with the following description by the anthropologist, Tim Ingold [2013], who has written extensively on practices involving making:

Here, every work is an experiment: not in the natural scientific sense of testing a preconceived hypothesis, or of engineering a confrontation between ideas ‘in the head’ and facts ‘on the ground’, but in the sense of prising an opening and following where it leads. You try things out and see what happens [p. 6].

In this research, experimentation involves exploring pattern cutting using metaphors. This enables new directions in pattern cutting to emerge, while evolving a more explicit account of tacit knowledge formed through material and spatial engagement in pattern cutting.

Fashion design can be practised in many different ways, depending on the aims, methods, interests, skills and backgrounds of individual designers. In my research and practice, fashion design involves the creation of wearable concepts for the body, translated through
spatial and material knowledge formed through experience with garment making practice. The forms that garments take are the result of specific material and spatial variables and decisions made through a personal interaction during their development. Pattern cutting conventionally refers to a practice that involves the creation of a template or blueprint [Rosen 2004] corresponding to a set of body measurements, forming the overall shape and individual component pieces of any garment, in a 2D format. A pattern is a collection of shapes cut in paper or card, which are used to cut the fabric before a garment is sewn together [Almond 2016, p. 169]. Material in the context of pattern cutting includes the fabric and supporting structural materials to which the pattern is applied, traced, and component pieces are cut. Patterns in my conventional practice were made by hand, using paper, cardboard and drafting techniques with rulers and measuring tapes. Pattern cutting can be considered a spatial practice that is used to clothe the human body. In such a consideration, the pattern is the representation of a distinct relationship between the garment, the body and the space between them. My research questions arose out of my existing practice of fashion design involving manual pattern cutting.

In my fashion design practice at the outset of this research, habits had formed through which I separated the activities of designing from pattern cutting. In the preface to this introduction, I relate a typical day in my pre-existing practice, to convey how habits involving pattern cutting had become systematic. My pre-existing practice was a micro-scale fashion design business, operational between 2007-2010, based in Sydney. I designed and produced womenswear garments and accessories and released two seasonal collections annually. In my practice, I designed garments through iterative drawing using figure templates. I refined these illustrations as a collection of fashion looks on paper and drew technical drawings of each garment before I created the sample garments using a mix of flat pattern cutting and drape conventions. Flat pattern cutting is a method involving the manipulation of a standard range of ‘block’ patterns, to create different garment styles, enabling efficiency in the production of patterns [Aldrich 2015; Dove 2013; Joseph-Armstrong 2013]. Drape involves using fabric directly on the mannequin stand, to model the shape for the garment pattern directly [Amaden-Crawford 2012; Duborg & Rix van der Tol 2014; Ilhen-Hansen 2012; Kiesel 2013]. In my practice both methods resulted in a paper or card pattern comprising all the component shapes and markings necessary to cut and construct a garment in multiple copies. In my business, I made all of my sample patterns and toiles, and many sample garments, a process through which my skills and tacit understanding of pattern cutting and garment making were developed.

The separation of design and pattern cutting is not unusual in industry practice where designers and pattern cutters often have different roles. Pattern cutting is often structured as being instrumental to design, based on a sequential organisation of activities. James et al. [2016] detail this separation as it relates to stages of design and make in the fashion production process [p. 144]. This separation of design and pattern cutting, however, causes a reduction in material creativity and spatial creativity in fashion design practice, as opportunities to experiment using pattern cutting is minimised. In his analysis of relationships between design and pattern cutting, Timo Rissanen [2009; 2013] identifies that the most common method in industry practice is design through drawing followed by pattern cutting. My conventional fashion design practice therefore aligned with customary distinctions that separated the roles of design and pattern cutting, as a separation of design and make [James et al. 2016]. Flat pattern cutting is well-known and widely used in industry practice, with this process of pattern cutting considered to be the most efficient and conventional method of pattern creation [Chunman Lo 2011; Dieffenbacher 2013; Faerm 2010; Hollen & Kundel 1999; Leach 2012; Rosen 2004; Sorger & Udale 2012]. The use of flat pattern cutting in my practice established repetitive habits that enabled me to work quickly and efficiently through the design and sampling process. However, over time, these methods sidelined creative opportunities in cutting. Using flat pattern cutting, I worked so quickly and routinely that more in-depth thinking and exploration of design through pattern cutting

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was underdeveloped. I realised that my methods of drawing followed by flat pattern cutting were causing a problem for creativity in design as these methods had established habitual thinking, which impacted experimentation in the cut of garments. By cut, I refer to the way that each garment pattern was designed through being shaped—the distinctive seam lines and details which together defined the overall form of each garment and its separate component pattern pieces. Others refer to cut as the ‘line of the garment’ [Sorger & Udale 2012, pp. 36-73] comprising seam and dart placement, together with their visual effect, and silhouette being the overall outline of the garment shape. As I was both the designer and pattern cutter, it was this issue of creativity in fashion design using pattern cutting in micro-scale practice that my research aimed to address.

The emerging research field of creative pattern cutting delineates new territory for review and discussion of the notion of creativity in pattern cutting. It has been established that fashion design can occur through pattern cutting. This is the case in contemporary research and the practice of zero waste fashion design, where practitioners assert that pattern cutting is fashion design [Rissanen & McQuillan 2016, p. 27] and the case of ‘Subtraction Cutting’, which practitioner Julian Roberts describes as ‘designing with patterns’ [Roberts 2013, p.15]. Kevin Almond [2016] defines creative pattern cutting as a practice that foregrounds the creativity of the pattern cutter as integral to design [p. 170]. Creative pattern cutting is sometimes referred to as creative cutting. Creative cutting can occur when a designer and pattern cutter work together very closely, or when a designer is also the pattern cutter. Creative cutting is not a new practice [Rissanen & McQuillan 2016]; it is conventionally encountered in high-end designer fashion and couture where the results of innovative cutting have typically contributed towards market level differentiation [Almond 2010, p. 16]. Almond [2013, 2016] identifies that the higher cost attributed to creative cutting is due to both the use of fabric and the time it takes to make a pattern. These costs signal towards intimate skilled practices that involve handling cloth and spatial knowledge in cutting, through which the practitioner experiments with finding a creative solution that underpins the structural integrity and aesthetic of the garment.

Skilled cutting underwrites the variability in practice for garment shape creation in fashion design, which forms creative cutting practice. There are many examples of creative cut in designer fashion, linked to notions of innovation in silhouette, shape, form or cut of garments. To understand and appreciate the artisanship of creative cutting requires insider knowledge of pattern cutting processes that challenge conventions in cutting. This insider knowledge is formed through a practitioner’s intimate encounter with translating a pattern into cloth and working between 2D and 3D representations of space using both rigid and pliable materials. Skilled cutting therefore involves the use of spatial and material knowledge developed through experience. This involves the understanding of how different qualities formed through the structure of varied fabrics combines with notions of fabric grain, drape, handle, finishes and internal structure. Together, these qualities when understood, contribute towards executing a final garment that is balanced in space in relation to the body. This understanding ensures the garment does not drag, fall off, loosen, or otherwise cause problems due to effects of gravity and movement of the body. Examples of creative cutting can be found by referring to the work of designers as varied as Madeleine Vionnet [Kirke 2012], Rei Kawakubo [Sudjic 1990, Bolton 2017], Issey Miyake [Koike 2016; Miyake 2001, 2012; Miyake & Reality Lab 2016], Alexander McQueen [Bolton 2011], Rick Owens [Owens 2011], ANREALAGE [ANREALAGE 2013], The T-Shirt Issue [HOID 2015], Aitor Throup [Throup 2017], and many others.

In the recent exhibition Fashion Game Changers [MoMu Fashion Museum Antwerp 2016], creative cutting underpins changes in silhouette that are described through their effects to give the body more freedom, or interpret the body more abstractly [Debo 2016, p. 7] than conventional silhouettes. Material and spatial knowledge, the individual tacit understanding of the pattern cutter through which their creativity is activated, remains under-researched. A more explicit account of this tacit knowledge in pattern cutting, however, is possible.
through practice-based research. My research provides an account for how a more explicit focus on material and spatial knowledge can enable experimentation that underpins the expansion of creative cut in practice.

Research that engages with the study of fashion design from a practitioner perspective is critical for broadening practice research in the discipline and for strengthening accounts of fashion design practice within both design research and creative practice research communities. Precedents enable sharing of methods that other designers can use or adapt, together with developing critical discourse concerning methods for practice research. Critical discourse is necessary to legitimate creative practice research methods for knowledge production in fashion design, in a way that is appropriate to the discipline and to underpin research quality and rigor. While there is richness in the discourse about creative practice research terms and methodologies in the field of creative arts and design more broadly [Barratt & Bolt 2010; Smith & Dean 2009; Vaughan 2017], criticality is only recently emerging from inside the fashion design field [for example, see Thornquist 2014], based on the more recent emergence of practice as an area for research. An increased interest in the practice of fashion has developed since the early 2000s and by 2009 the first journal dedicated to fashion practice, *Fashion Practice: the Journal of Design, Creative Process and the Fashion Industry* was established [Jenss 2016, p. 9]. Practice-based research is situated in this emerging research area. My research is conducted through practice; it forms a practice-based research enquiry that applies a creative practice research methodology. This methodology is centred through explicit reflection-on and through the practice of design using creative cutting.

In a fashion design context, design is often described simply and generally as a list of discrete processes, representing a chain of activities. This simplicity is evident, for example, in descriptions of the fashion design process such as ‘inspiration, conception, research accumulation, mood-board creation, fabric selection, the croquis process and final editing’ [Faerm 2010, p.76]. This type of description of fashion design doesn’t acknowledge the nuances of the individual practices in which design takes place. Fiona Dieffenbacher [2013] describes the fashion design process as a ‘more intimate process that speaks to how the designer has developed their own particular approach and thinking’ [p. 10] while noting that the individual processes remain undocumented. Contemporary research concerning fashion design practice reveals a need for fashion practitioners to develop articulation and communication of fashion design processes, as they emerge from individual sites of practice implicating the role of tacit knowledge [Finn 2014; Norris-Reeves 2014; Lee & Danko 2017]. Tacit knowledge refers to practical knowledge that can be known but not expressed in words [Albers 1944; Dormer 1994; Gascoine & Thornton 2013; Igoe 2010; Polanyi 1966, 1983]. Fashion designers can provide more evidence for how creativity operates within the context of individual designer practice and how this relates to the multifaceted field of design practice and its research [Bye 2010; Finn 2014]. This requires more in-depth and integrated accounts of practice, which evidence their complexity. My research demonstrates that in pattern cutting this involves articulating how spatial and material knowledge is formed and negotiated, to progress experimental practice in pattern cutting.

Creativity is a complex and contested notion that is often used to refer to something that is new. A study of definitions of creativity in the context of design research reveals it is most commonly understood to involve ideas, products or solutions that are ‘novel and valuable’ [Chakrabarti 2011, p. 349]. Creativity is reported to be a ‘mantra’ [Ruppert-Stroescu & Hawley 2014, p. 19] of the fashion industry, and as such, there are many different interpretations of creativity that a fashion designer can encounter. While the overuse of terms such as ‘creativity’ and ‘innovation’ can render them meaningless [Niedderer & Townsend 2014, p. 149], there is an ongoing need to provide better accounts of creativity in fashion design as it emerges through individual variations in practice. The ubiquity of creativity, as a term associated with fashion design in the industry, means
that it is applied to distinctly different phenomena. Fashion design creativity is often associated with market level creativity—how fashion design is translated across different sectors. For example, through conducting research with fashion designers, the notions of ‘leadership’ and ‘adaptive’ creativity are used to account for a range of variables between originality and adaptation of ideas in fashion design [Ruppert-Stroescu & Hawley 2014] as those ideas relate to different segments of the market. Such accounts of creativity in fashion design miss the nuances of material creativity and spatial creativity that are experienced in individual sites of practice.

My research makes a contribution to the emerging field of creative pattern cutting through the formulation and introduction of two new terms—material creativity and spatial creativity, which aim to account for tacit knowledge in pattern cutting and how it can be directed towards experimentation. These notions offer a new framework for thinking through and expanding creativity in pattern cutting for fashion designers. In my research I created a metaphoric strategy to direct experimentation in pattern cutting. This was useful because the repetition of pattern cutting methods in my practice had formed habits which in time became tacit, through repetition and limited creativity. My research demonstrates how a metaphoric strategy can be used to raise more explicit awareness of the role of tacit knowledge in the practice of experimental pattern cutting. Greater awareness of tacit knowledge and the values that underpin practice enhances the development of material creativity and spatial creativity in pattern cutting. For a practitioner, tacit knowledge is a challenge in a research context, as the communication of knowledge is fundamental to research, yet there are difficulties with transferring tacit knowledge to language when attempting to contextualize the practice through written accounts. To aid in the articulation of my tacit knowledge formed through pattern cutting, my strategy was to use metaphors to both reflect and raise explicit awareness of this personal knowledge, in order that it might be communicable.

Metaphor is defined in general terms as a figure of speech (a name or descriptive word or phrase) transferred to an object or action that is different from, but analogous to, that object or action [Shorter Oxford English Dictionary 2007]. An analogy, meanwhile, is an instance of correspondence or adaptation of one thing to another [ibid.]. Hence the use of metaphor and analogy are interconnected. In my research I found that metaphors have unrealised potential as strategies to expand material creativity and spatial creativity in fashion design through pattern cutting practice—they assist to aid reflection of and articulation of the tacit knowledge involved in these activities. This is because both material creativity and spatial creativity require engagement through practical handling; this knowledge formed through handling is difficult to communicate. My research therefore makes a contribution to the field of creative practice research by identifying how metaphors can be used more explicitly through practice to aid in the articulation of non-verbal activities. In my research I establish that metaphors can both enable experimental pattern cutting, while aiding reflection on the habits of conventional practice. To develop metaphors for testing, I created a study of butterfly metamorphosis. It is through this creative research practice that my methods for the articulation of experimental pattern cutting practice were developed.

My research demonstrates that experimental pattern cutting can be developed through a more explicit awareness of spatial and material knowledge formed through pattern cutting. This awareness is developed through testing and applying a strategy of metaphor. A practitioner experiences material creativity and spatial creativity when designing and making garments through individual engagement with materials and cutting methods using 2D and 3D imagination. Discovery can occur through experimentation which changes the design outcome in some way that is unanticipated but yields new or innovative results. Expanding creativity in pattern cutting requires that practical experimentation is undertaken when cutting, while reflection on conventions in pattern cutting is facilitated. In the case of my practice, this practical experimentation is facilitated using hand-based
processes, alongside reflection and through these processes. Testing materials and methods by hand takes time as iteration is often required [Niedderer & Townsend 2014]. Hence, there is an evolution and development process that is important to account for. Both material creativity and spatial creativity require distinction from market-oriented creativity, as this creativity is formed through physical activities and personal interactions with materials and techniques. Creativity, therefore, emerges through material practice and evolves with experience. Expanding material creativity and spatial creativity in experimental pattern cutting involves attuning closely to the personal experience of working with and analysing patterns, as both 2D templates and 3D garments.

My research questions were developed as a result of the issue of creativity in pattern cutting for fashion design. More generally throughout this research I was led by an overarching concern to elaborate upon what creativity might mean in the context of creative pattern cutting. I refined my questions which directed this research into the following:

### 1.2 Research questions

1. How can the generation of metaphors expand material creativity and spatial creativity in fashion design through experimental pattern cutting?

2. How can tacit knowledge in fashion design be articulated for practice-based research?

### 1.3 Research context

#### 1.3.1 Research and practice of creative pattern cutting

Pattern cutting practice has been revitalized through the establishment of creative pattern cutting as a platform for research. The ‘resurgence of interest’ [Almond 2016, p. 169] in pattern cutting as a field of study is due to a call for the creative skills of the pattern cutter to be valued at the same level as the designer, with creative cutting considered ‘integral to the elevation and execution of contemporary fashion design’ [Townsend & Mills 2013, p.104]. The International Conference for Creative Pattern Cutting [University of Huddersfield 2013], was inaugurated by Kevin Almond and followed by a Special Edition of selected papers published in the International Journal of Fashion Design Technology and Education in the same year. These were the first cases of contemporary research on the subject of creative pattern cutting [Almond 2013, p. 71]. Key to this area of research is knowledge arising from sites of fashion practice that involves the ‘observation, participation and investigation of pattern cutting practice’ [ibid.]. As a practice-based research enquiry, my research provides new evidence for how experimental pattern cutting practice can be developed from an existing practice of conventional pattern cutting.

I presented an in-progress paper from this Ph.D. research at The 2nd International Conference for Creative Pattern Cutting [University of Huddersfield 2016], receiving valuable feedback and insights into the scope of this field. It was evident that there are many examples of research emerging from teaching practice involving novice and emerging designers—eleven out of 26 total program abstracts were teaching based [see Almond & Power 2016b]. A rigid perception of pattern cutting is acknowledged to be a difficulty within university learning environments, whereas in contrast, advancing creative notions and methods of pattern cutting form a significant focus for research. Since these research approaches are
primarily focused on creative thinking in pattern cutting, they are commonly concerned with techniques alternative to conventional flat pattern cutting and drape methods. Examples include projects that explore the integration of a box and a garment [Hardingham 2016], geometries in pattern cutting [Montgomery, Henry & Brotheridge 2016], making patterns for human faces [Climer 2013], and making patterns using alien bodies [Campbell 2015]. A common factor in each of these cases are methods of pattern cutting that involve circumventing rigid body templates and mannequins as starting points for 3D spatial practice in pattern cutting. Alternative sculptural forms for modelling, such as faces, alien bodies and boxes, allow exploration in shape making practices to occur, while planar shape geometries also facilitate alternative explorations of shape making for garment integration. Precedents for this type of practice are found in the 3D shape making techniques integrated in the pattern cutting demonstrations of Shingo Sato [2012, 2014] and Tomoko Nakamichi [2010, 2011, 2016]. Sato demonstrates his techniques using fabric and modelling materials directly to hand while Nakamichi more traditionally presents techniques drafted using 2D drawings. It is evident that each of these methods that involve sculptural modelling techniques seeks to challenge conventional pattern cutting methods for teaching practice at university level.

Individual fashion practitioners are contributing to developments in creative pattern cutting research in exciting ways. These contributions include new methods for cutting that challenge conventions established through the industrialization of pattern cutting. Rissanen [2013] and Holly McQuillan [Rissanen & McQuillan 2016] have assisted to establish contemporary research concerning zero waste fashion design. Zero waste pattern cutting involves the design of pattern pieces using the dimensions of the intended piece of cloth, to eliminate fabric wastage in the cutting stage. The priority afforded to the fabric at the outset of the design process subverts conventional industrial practice through which the fabric is conventionally considered the last step in cutting. Rickard Lindqvist [2015] has developed a new theory of the body for pattern cutting, ‘Kinetic Garment Construction’, This theory situates a live, moving body at the centre of pattern cutting practice, while critiquing the abstract and static body representations encountered in industrial pattern cutting systems, derived historically from the tailoring matrix. Lindqvist’s rigorous and detailed analyses of pattern cutting principles and history of methods is advanced through the practical demonstration of his drape methods, photographed in a way that contemporizes drape methodology while critiquing the conventional block pattern cutting systems. Research by Ines Simoes [2013] similarly takes the problem of the static body as a starting point for pattern cutting research, aiming to combine different positions of movement into block patterns, which conventionally have a single orientation.

In the practice of ‘Subtraction Cutting’ by Julian Roberts [2010, 2013, 2017], creativity experienced through both material and spatial practice in pattern cutting is foregrounded. Roberts demonstrates the critical possibilities of creative cutting to subvert conventional paradigms in garment design. Roberts evidences through the systematic documentation, dissemination (including teaching) of his methods of practice the variability in forms and silhouettes that creative cutting can enable when industrial codes of practice are held to scrutiny. Roberts critiques the flatness of fashion garment drawing and front views of fashion looks, while innovating methods of block pattern cutting by combining them with fabric tubes. The principles of ‘Subtraction Cutting’ involve creating holes (subtractions) and joining them in various ways to create draped sculptural garments that express variation each time a garment is made using the method. This variation results from how each hole is shaped, placed, cut, and rejoined by individual practitioners of the method. Roberts’ method involves working from an alternative spatial perspective for pattern cutting to what is standard in industrial practice. Through the use of tubes and the notion that the body passes through them, the spatial arrangement of block patterns as planar front and back representations of the body is disrupted. This demonstrates that through activating both material and spatial variables in pattern cutting, creativity can be integrated. Additionally, Roberts shows how creative cutting can be introduced to novice pattern cutters, as well as...
experienced makers. More examples from designers that demonstrate individual methods for expanding creativity in practice are required to increase research in this area of practice. This is important for the development of a community of research practice, through which alternative methods can be shared, tested and analysed in a critical and rigorous manner.

Evidencing a broader application for creative cutting, and the transferability of knowledge beyond the immediate context of fashion design practice, a number of exhibitions have focused on displaying the creativity of pattern cutting from different perspectives. These have included *Patronen/Patterns* [Verhelst & Debo 2003] exhibition at MoMu, *Drawing and the Body* [Hodes & Loscialpo 2011] hosted jointly by the London College of Fashion and the Swedish School of Textiles, and *Block Party: contemporary craft inspired by the art of the tailor* [Crafts Council 2011]. Patterns often remain behind the scenes, intimate to the practices of fashion designers but seldom shown as objects for study in their own right. *Patronen/Patterns* included a collection of 25 garments along with their patterns [Debo 2003, p. 13], evidencing the workmanship of the pattern in a new context for public display. *Drawing and the Body* situated practitioners between fashion and fine art, elevating pattern cutting through its inclusion as a creative drawing practice that represents the body in unique ways. Meanwhile, the *Block Party* exhibition included the work of artists who engage with pattern cutting in interdisciplinary contexts beyond the fashion garment [Sissons 2014, p. 261]. Represented in this exhibition were practitioners such as Rhian Solomon [2013], who through the SKINship project, explores comparative methods between pattern cutting and surgical cutting, through to Dai Rees [Scardi 2010] who manipulates patterns to facilitate unpredictable distortions for sculptural silhouettes [Sissons 2014, pp. 261-263]. This expansion of pattern cutting out of the fashion design studio and into exhibition for public display connects these practices with wider audiences, while also evidencing the many different contexts through which pattern cutting can be interpreted both as a spatial and material practice. These contexts involve experimentation with pattern cutting practices beyond conventional notions of pattern cutting based on traditional methods.

Creative cutting is an important contributor to innovation in fashion design in the industry. Key industry leaders have identified a threat to diversity in the future of fashion design due to a reduced focus on creative cutting. Lectra claims that the next 10 years will see as much change in the fashion industry as in the last 100 [Lectra 2015, p. 2], due in large part to the continued effects of globalization, new technologies and changing consumer landscapes. The fashion industry has evolved through business models and manufacturing practices which are shaped by ‘growth, globalisation and more and cheaper’ [Fletcher 2015, p. 18]. However, globalized markets are connected to eroded product differentiation [Luckman 2015, p. 69]. Alongside an increase in the volumes of garments produced at cheaper prices, is an increased similarity in pattern shapes and diminishing quality. One of the key markers of quality in garment design is evidenced through creative cutting. With less variation available, there is a threat to creativity in the industry [Lectra 2015, p. 4]. Esteemed trend forecaster, Li Edelkoort [2015] echoes this sentiment identifying a decrease in fashion design creativity ‘which might transform the silhouette’ [p. 1] in innovative ways. Hence a reassessment of creativity in fashion design seems imperative from this perspective and a reason why creative cutting is important to expand upon for the future of fashion design practice.

Creative cutting has typically been reserved for the highest ends of the market. Contemporary fashion design practice, however, evidences that market levels which once maintained clear divisions between practices of haute couture, ready-to-wear and mass-market are experiencing transition, as they diversify beyond traditional structures [Aakko 2016]. An example of this diversification can be seen through the retailer COS, which integrates creative cut into garments for everyday wear. The recent publishing in the limited-edition book of creative cutting practices by Usha Doshi [2017] for COS, together with the release of garments in-store, evidences the importance of creative cutting as a differentiating factor in the market. More specific accounts of creativity in pattern cutting which account for both material creativity and spatial creativity in practice, combined with
critical reflection, is required to develop research in creative pattern cutting, and to continue
to expand contemporary practice and adaptation. This will underpin the development and
expansion of practices and theories in pattern cutting more broadly.

Craftsmanship in fashion design is conventionally associated with haute couture, high-end
designer or bespoke tailoring, while craft as a popular notion is more often connected to
maker communities. With the changed understanding of couture after the 1920s [Bugg
2006, p. 89], fashion, in the past, became disassociated from craft. Contemporary fashion
designers, however, are drawing new attention to the values of craftsmanship [Teunissen &
Brand 2014, p. 23] in different ways, and the notion of craft is evolving. This signals a revisiting
of notions of care and attention towards how garments are manufactured, together with
the development of skilled hand practice. Maarit Aakko [2016] provides a revised definition
of the term ‘artisanal’ appropriate to the context of contemporary fashion, denoting that
it refers to ‘something crafted by hand’ [p. 76] and extending the application of the term
beyond its systemic identification with couture. Artisanal in the case of contemporary
fashion practice refers to ‘all material-related phases in fashion design’ [ibid.] including
‘patternmaking and garment construction’ [ibid.] if done manually. Creative cutting can be
considered an artisanal practice; if done manually, it involves a level of care and skill that
embraces notions of craftsmanship. In their research concerning the creative cutting of
zero waste fashion design, Katherine Townsend and Fiona Mills [Townsend & Mills 2013]
argue that pattern cutting can be considered ‘more as a craft practice where creativity is
integral’ [p. 104]. The small-scale practice of individual designers who practice by hand can
evidence creative cutting. This indicates an under-researched area of contemporary practice
in creative cutting, and also a means of connecting research in pattern cutting with craft
research in the wider creative practice research community, through the notion of artisanal
practice. These transitions in contemporary practice have been contemporaneous with the
undertaking of my Ph.D. research, and subsequently impact how my understanding of my
practice, its aims and context has also evolved.

Conventional methods of pattern cutting include flat pattern cutting and drape. At the
outset of this research, these methods were used interchangeably in my practice, and
were the methods through which I learnt how to produce garment designs. In time,
these methods became habits—repeated conventions that facilitated efficiency in fashion
design using pattern cutting. Flat pattern cutting is represented predominantly as a drafting
method undertaken manually or digitally. There are many textbook style manuals of flat
pattern cutting with differences in individual author styles, but common technical principles
MacDonald 1997; Meliar 1968; Mors de Castro 2010; Pepin 2010]. Flat pattern cutting
relies on manipulating pre-existing patterns called ‘blocks’ to create individual garments,
with the shape of each corresponding to a range of standard garment types (e.g. pant,
bodice, skirt) in turn reflecting standard body sizes. Although it is understood that block
sizes vary between practices, one of the benefits of flat pattern cutting is that a size range
can be fixed by the use of pattern blocks which code particular measurements relating
to the body. Flat pattern cutting, therefore, is widely used in the fashion industry due to
sizing accuracy and the speed it enables in the process [Aldrich 2015] as measurements do
not need to be rechecked each time a block pattern is used. Values of accuracy and speed
are associated with the industrialized production line, where quantity rather than quality
defines parameters for problem solving and design innovation.

Drape methods involve manipulating fabric directly on the mannequin stand, marking up
this fabric, and often transferring this information to create a paper pattern. Originating in
couture practices, drape is otherwise known as moulage:

‘The French term ‘moulage’ comes from moule, a mould, and originally means
forming an object with the aid of a mould.’ [Duborg & van der Tol 2014, p. 9]

Drape methods are also predominantly represented through textbook style manuals
[Amaden-Crawford 2012; Duborg & Rixt van der Tol 2014; Ilhen-Hansen 2012; Küssel
2013]. In the past, however, patterns were rarely made. Frieda Sorber [2003] relates that 18th century publications evidence that ‘a really good tailor did not use a pattern’ [p. 24] leading to the conclusion that the pattern came into circulation as a way to manufacture cheap clothing [ibid.]. The practice of flat pattern cutting and drape are not mutually exclusive and methods can be used in combination. There are methods, however, involving a practitioner’s handling of materials in pattern cutting that are not necessarily captured by conventional representations of the pattern cutting process.

Technical innovation is occurring in the digitalisation of pattern cutting, however, innovation that is embedded in contemporary, artisanal practices requires closer study to tease out how tacit knowledge of materials influences this area of practice. It is through the myriad of hand-based practices that individual differences can be explored to underpin the development of creative cutting. It is however evident that creative cutting is on the cusp of digital innovation, since issues with accuracy in digital prototyping of fabric drape qualities, which has limited the uptake of these technologies in fashion design manufacturing compared to other industries, is improving [Papahristou & Bilalis 2017]. New practices that adopt virtual modelling methods, such as those demonstrated by Atacac [2018], integrate interdisciplinary capacity and thus demonstrate potential for innovation, particularly in the context of communication of methods of creative cutting and its prototyping. I refer to the digitalisation of pattern cutting and fashion design, and the creative possibilities enabled through this, to acknowledge that this is an area of research beyond the scope of my study, as it is limited to hand-based practice.

Once pattern cutting principles are learnt and mastered, exploring creativity spatially and materially is imperative to developing creative cutting. Drape methods involve the hand manipulation of materials, entailing an in-depth understanding of the tactile variations of cloth through the handling of materials, which develops over time. This tacit understanding garnered through handling materials also translates to the ability to create 3D outcomes, as a practitioner gains more experience working with different fabrics and draping techniques.

The interrelationship of pattern cutting and understanding of fabrics, is acknowledged to be highly influential, contributing towards what is called ‘intuitiveness’ [Townsend & Mills 2013, pp. 104-105] in cutting. This notion of intuition signals towards the role of tacit knowledge. Tacit knowledge is knowledge of a personal type developed through practical experience, however, it is not easily transferable through verbal communication [Dormer 1966, 1983]. Pattern cutting and drape methods both rely on tacit knowledge; these techniques are learnt through adapting visual drafting and measurement methods, handling materials and specialised tools, and analysis involving 2D and 3D imagining. These skills rely on practical know-how that is difficult to put into words; as tacit knowledge, this type of knowledge is often shown or demonstrated [Dormer 1994]. On the surface, tacit knowledge seems inaccessible or even unknowable, as it is knowledge that is formed through bodily and sensory interactions, through the doing and feeling of working with materials. Tacit knowledge plays a significant role in the practice of pattern cutting by hand. However, without actively attuning to how this knowledge is used it can prove repetitive and difficult to challenge. In my research, I demonstrate that when tacit knowledge of materials and spatial understanding is foregrounded, these are key factors that underpin creativity in cutting.

Manual pattern cutting is a process that is directed by intimate engagement with materials and spatial imagination in a broader way than what the representation of a template or paper pattern signifies. In my research I experiment with pattern cutting using traditional fashion design materials, specifically, cloths comprising predominantly silk and cotton that I am familiar with using. My use of conventional cloth is important to note because through it I demonstrate that creative cutting does not require the use of advanced or special types of materials, although it can do. This research is not about materials per se, but the creative affordances that can be made through attuning to the tacit knowledge formed through practice and experimentation that is possible using this material and spatial understanding.

My aim is to convey the synergy between cutting and materialisation which is where the
The interrelationship between material creativity and spatial creativity is encountered. Too often pattern cutting is represented as a practice that is separate from materials; abstracted through measurements and steps, it becomes mathematical. Materials then take on inert properties; they wait at the end of the cutting process to be cut using the pattern.

Plenty of information and how-to guides are available on the myriad of traditional techniques that fashion designers might apply in practice, however, creativity in pattern cutting requires the articulation of methods of experimentation. Most examples of traditional techniques rely on an inventory of methods with step-by-step demonstration [Aldrich 2015; Amaden-Crawford 2012; Chunman Lo 2011; Dove 2013; Duborg & Rixt van der Tol 2014; Ilhen-Hansen 2012; Joseph-Armstrong 2013; Kiesel 2013; Kim & Uh 2002; MacDonald 1997; Meliar 1968; Mors de Castro 2010; Pepin 2010]. Pattern cutting is also available through a variety of online platforms, which offer kit based pattern cutting projects for individual garments for home-based makers. Patterns available through the online store Colette [2017] are one such example, while local designer Emily Hundt of In the Folds [2017] sells patterns in a downloadable PDF format. There is little representation of how to direct experimentation using conventional pattern cutting, or through reconsidering pattern cutting practices in entirely new ways. The trials and errors involved with developing material creativity and spatial creativity through working directly by hand with materials and methods are not freely shared.

From the position of the practitioner who develops these experimental methods, the ways in which material creativity and spatial creativity evolves within the context of particular designer practices remains largely unarticulated. However, experimentation remains essential for developing material creativity and spatial creativity in practice, and as such, is an important factor that can lead innovation in fashion design.

Experimental pattern cutting is defined in this research as exploratory cutting activities that contribute towards the development of new garment shapes or cutting processes, rather than outcomes resulting from the practice of repeating known conventions. My research makes a contribution to the emerging research field of creative pattern cutting through articulating my tacit knowledge when performing experimental cutting methods. In my research I frequently asked myself what is creative in creative pattern cutting? What does creativity mean in this context? I introduce the new terms material creativity and spatial creativity to describe the particular forms of creativity that a practitioner experiences in experimental pattern cutting. Experimental pattern cutting is therefore a more specific practice within creative cutting, emphasizing practices that challenge conventions in traditional pattern cutting however separating these practices from market oriented outcomes. Through expanding the application of material creativity and spatial creativity in my pattern cutting practice, I developed a new method of experimental cutting that I term Dynamic Cutting. This method involves using tacit knowledge formed through spatial and material engagement in pattern cutting, to direct the design of garments in unique and creative ways each time the method is applied. The projects outlined in this thesis represent the stages of development and integration of different types of spatial and material knowledge, which together underpin Dynamic Cutting.

1.3.2 Fashion design and the role of tacit knowledge

The study of experimental pattern cutting from the perspective of the fashion design practitioner requires a considered account of tacit knowledge. Experimental pattern cutting practice involves the manipulation by hand of materials and techniques before finalisation into completed garments. The results of the fashion design process have predominantly been studied from the context of the finished garment, while the practices remain hidden [Jenss 2016, p. 9]. Some of the earliest research concerning the fashion design process by a designer evidences that articulation of tacit processes by designers is difficult:
In my work as a practicing designer I recognise that one rarely analyses the process one is engaged upon, one just does it [Aldrich 1990, p. 19].

Meanwhile, this remains a contemporary issue:

All of these things that I say about process, you know I'm a fraud, right? [. . . ] I can tell you all these things about how I do it, but I just don't know [Owens 2014].

Contemporary research reveals that while individual fashion designers might know their own process in the context of their practice, it doesn't follow that they can always articulate it [Soo Lee & Danko, 2017, p. 660]. This issue of tacit knowledge in pattern cutting involves *material creativity* and *spatial creativity*.

Tacit knowledge refers to practical experience that can be known but not expressed in words [Albers 1944; Dormer 1994; Gascoine & Thornton 2013; Igoe 2010; Polanyi 1966, 1983]. Michael Polanyi [1966, 1983] introduced the term *tacit knowledge* by claiming that ‘we can know more than we can tell’ [Polanyi 1983, p. 4], indicating that there is a type of knowledge that is not articulated in words. Bauhaus textile designer, Anni Albers [1944], describes this inarticulacy as ‘an intelligence expressing itself in other means than words’ [p. 27] while others state that this knowledge can be shown or demonstrated [Dormer 1994]. Sometimes tacit knowledge is called ‘craft knowledge’ [Dormer 1994, p. 13] or ‘local knowledge’ [p. 11]. At other times it is referred to as ‘personal knowledge’ [Polanyi 1958] or ‘practical knowledge’ [Gascoine & Thornton 2013, p. 5]. As professional practices rely on tacit knowledge through the performance of activities, this type of knowledge is also described as ‘embodied knowledge’ [Ignatow 2007; Schindler 2015, p. 2] as it involves bodily senses and experiences. In experimental pattern cutting, a complex interaction between thinking and its materialisation occurs as a process of development. The thinking that occurs through manipulating materials is termed ‘material thinking’ by Paul Carter [2004] and denotes a quality experienced in craft practice that involves ‘thinking through the hand manipulating a material’ [Nimkulrat 2010, p. 64; 2012, p. 1]. Carter’s [2004] notion of material thinking is elaborated upon by textile practitioner Nithikul Nimkulrat:

Carter’s (2004) conception of ‘material thinking’ offers a view on active materials in creative processes. According to him, materials are not passive nor are instruments, but interact with the maker’s artistic intelligence when his or her hands, mind, and eyes are connected in a creative process. Through handling materials in practice, a form of tacit knowledge arises, providing a particular way of understanding the practice that is grounded in the hands-on practice itself [Nimkulrat 2012, p. 3].

In an artisanal practice of fashion design involving pattern cutting, this handling of materials largely remains tacit, embedded in the specific hand based activities of localised designer practice.

Researchers acknowledge the inherent difficulties of tacit knowledge in fashion design practice and its research [Finn 2014; Norris-Reeves 2014]. Angela Finn [2014] outlines lacking consensus about ‘what constitutes practitioner knowledge in fashion’ [pp. 21-22] and how this relates to the practice of design [ibid.]. Suzie Norris-Reeves [2014] identifies that while there are existing fashion designer interviews that do relate their ‘subjective processes by which design is materialised’ [p. 18], ‘critical visual methodologies’ [p. 19] and archiving of fashion practitioner ephemera are missing. This is especially the case when compared to other creative disciplines [p. 2]. Finn argues that advancing fashion practitioner research involves exploring issues of tacit knowledge and developing specific language and communication [Finn 2014]. Understanding the role of tacit knowledge in fashion design practice requires explicit, critical reflection on this type of knowledge.

In fashion design, the tacit knowledge of a practitioner is localised in individual practices and formed through communities of practice. Ethnographic studies of fashion designers
evidence the localisation of this knowledge. A study by Eckert & Stacey [2000] revealed how tacit knowledge operates between members of a team, enabling them to create shared understandings of the design process and goals. Tacit knowledge, in this case, involved shared cultural references that express design ideas. Communication amongst designers was noted to be very different from when they communicated with others participating in the business, including managers, sales and retail representatives [Eckert & Stacey 2000]. In a study of fashion design tuition at the Antwerp Academy, Todd Nicewonger [2016] evidenced that a model of socialisation integrates those who are experts in a community of practice and those who want to enter that community; specialised language facilitates interactions between both students and teachers. This context provides a set of practices described as a community of practice; a shared, informal and familiar way of practising which is rarely made explicit [p. 124].

In their summary paper from the 2nd International Conference for Creative Pattern Cutting [University of Huddersfield 2016], the convenors, Almond and Jess Power [Almond & Power 2016], identify that tacit knowledge, practice-based enquiry and ‘the use of unconventional methods to create 3D forms’ [p. 95] are key concerns in the field. In addition Almond [2013] emphasises that ‘we should not underestimate tacit knowledge and the making process as a form of enquiry’ [p. 71]. What is required is evidence from individual designers that interrogates how creativity operates in the practice of pattern cutting and the different ways in which this can occur.

In Richard Sennett’s [2009] view, tacit knowledge requires a relational self-consciousness, an explicit awareness that can, therefore, critique what is more instinctual or tacit:

In the higher stages of skill, there is a constant interplay between the tacit knowledge and self-conscious awareness, the tacit knowledge serving as an anchor, the explicit awareness serving as critique and corrective. Craft quality emerges from this higher stage, in judgements made on tacit habits and suppositions [p. 50].

This link between tacit knowledge and self-consciousness is associated with the development of skill, continual improvements in practice, and quality [Niedderer & Reilly 2010; Polanyi 1966, 1983; Sennett 2009].

Donald Schön [1983] established reflection as a method to gain insight into tacit knowledge in professional practice. In The Reflective Practitioner [1983] he outlines his views on practice and tacit knowledge in the undertaking of everyday and professional activities:

When we go about the spontaneous, intuitive performance of the actions of everyday life, we show ourselves to be knowledgeable in a special way. Often we cannot say what it is that we know; [. . .] Our knowing is ordinarily tacit, implicit in our patterns of action and in our feel for the stuff with which we are dealing. It seems right to say that our knowing is in our action [p. 49].

Schön identifies this as ‘knowing-in-action’ and distinguishes ‘reflection-in-action’ [pp. 49-54] as that process through which we think about what we are doing, while we are doing it [ibid.], enabling access to embedded knowledge involved in the act of doing something. In the acquisition of a skill over time, for example, ‘the feelings of which we are initially aware become internalised in our tacit knowing’ [p. 50]. This internalisation of knowledge was the case with my conventional practice of pattern cutting. The development of my abilities to reflect more critically on my practice enabled me to understand how tacit knowledge influenced the values of my practice. ‘Reflection-in-action’ is distinguished from ‘reflection-on-action;’ the latter describes reflection that occurs after activities have taken place. In Schön’s notion of the reflective practitioner, the practitioner subsequently takes up the position of a ‘participatory observer’ [Coessens, Krispin & Douglas 2009, p. 50] who can make judgements and assessments of their practice in a way that can influence and hence alter it.

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In the case of my conventional practice at the outset of this research, a sense of rush and repetition kept the pace of practice moving forward; the activities were structured and undertaken one after the other. The scale of activities meant that this sense of rush was inevitable; to get through the work, I needed to keep going and work efficiently. Reflection was undertaken and useful only in the sense of it being instrumental to the activities continuing in the same direction. A deeper level of thinking which could assist me to take advantage of opportunities to practice differently was underdeveloped. The distinction I am making here is between reflection that benefits practice in a continued direction and reflection for the benefit of transforming that practice in some unprecedented way to improve it. Ulrich Lehmann [2010] expresses this as a distinction between knowledge of how to do something for a desired result, and knowledge linked to innovation:

If making is knowing, it does not follow that all makers “know” their craft. They might know how to produce an effective, economical, or detailed result. But this does not mean that they can change completely, reverse or deconstruct their techné in such a way as to challenge established thinking about this craft [p. 151].

As a result of this research process, I realised that both types of reflection were underdeveloped in my conventional practice. The pace of working and the scale of activities did not facilitate reflective thinking. In my practice, repetition of activities created a sense of automation; by doing similar actions every day, I seldom thought more deeply about the meanings of them. Schön [1983] elaborates further on the value of reflection for practice:

Through reflection, he can surface and criticise the tacit understandings that have grown up around the repetitive experiences of specialised practice, and make new sense of the situations of uncertainty or uniqueness which he may allow himself to experience [p. 61].

To develop ‘reflection-on-action’ I first had to recognise exactly what that action was. As the Ph.D. research progressed, strategies to develop more effective reflection for practice involved many trials and errors. This was because I needed to find methods that could comfortably align with my methods of practice. To reflect on the different dimensions of my practice, I needed to identify physical as well as cognitive activities. What do I do, and what do I think while I do it? To reveal what I do, journaling became a vital technique in collating together written, drawn and visual reflections, with photographs of daily practice. Through sustained development and iteration of my journaling method, this evolved into an approach I could rely on as a system of referencing that I could continually refer back to. My journals, therefore, evidence many trials, questions, ideas and problems that were encountered with design explorations; as a record, they provide a rich documentation of activities that ordinarily were not recorded. My journals are also a record of my practice of reading and reflecting on contextual research I conducted to better situate my understanding of my practice. I found through integrating drawing when reading, including the use of maps, that I could more easily refer back to text-based information, together with my ongoing design experimentation.

‘Reflection-in-action’ was harder for me to recognise, and over time, I integrated new methods into my practice that enabled this type of reflection, which is further elaborated by Haseman and Mafe [2009] as reflexivity:

Reflexivity is one of those ‘artist-like processes’ which occurs when a creative practitioner acts upon the requisite research material to generate new material which immediately acts back upon the practitioner who is in turn stimulated to make a subsequent response [p. 219].

Hence, ‘reflection-in-action’ occurs in the process of doing something, and is, therefore, part of an iterative process. I renewed my efforts in documenting my practice several times, and this involved diversifying my methods. I included note-taking while making,
jotting shorthand in my journals as a specific way to note thoughts which occurred at the moment. Visual records, however, were also important. I incorporated photography while making and expanded the use of video. Videos assisted me to capture the idiosyncrasy of my individual making approach by focusing on the activities of my hands, from a more objective viewpoint. I used my notes, together with my photographs and videos to write more detailed reflections, shortly after completing studio practice.

Allowing time to reflect in the process of making was a difficulty I experienced in this research process. I am used to making quickly and consequently I expanded my practice to include practices where I make slowly, as these enabled me to develop more successful and critical reflective practices. I repurposed what I had considered peripheral, hand-based activities, for the benefit of my fashion design practice. Specifically, this included making more use of hand stitching, drawing and handmade journals. Using my hands to move materials around, or to repeat small gestures, as in mark making through stitching and drawing, enabled me to slow down and to think more deeply. Creating my journals by hand achieved this purpose, as I relied on thinking through hand-based activities that combine cutting, pasting, drawing and writing. My reliance on reflection while using my hands became very apparent with thesis writing, during which time I have continued handmaking as a way to think through and process daily writing. Expanding peripheral activities of embroidery and crochet allows me to use my hands to make stitches in a repetitive way, an action that enables a distracted meditation and deeper reflection.

### 1.4. Methodology

The design research methodology I apply in my research is a creative practice research methodology, constructed from several sources. Within creative practice research communities, there are multiple and often interchangeable usages of terms to describe creative practice research approaches. These include practice-led, practice-based, artistic practice, creative practice, arts-led, arts-based, design-led, design-based and performative [Barratt & Bolt 2010; Brook 2012; Grierson & Brearley 2009; Haseman & Mafe 2009; Makela et al. 2011; Smith & Dean 2012; Vaughan 2017]. This multiplicity broadly reflects different professional practices out of which creative practice research approaches have emerged [Makela et al. 2011] together with differences across academic institutions and geographic locations.

Situated at RMIT University “practice-based” describes the research methodology that focuses a design practice research approach for Ph.D. level degrees since 2002 [Blyth & Stamm 2017, p. 53]. The notion of practice as a case study is foregrounded, together with situating the practice within a community [pp. 58-59]. This focus requires articulation of communities of practice—convergences, divergences, and influences, alongside critical inquiries. Taken together, this grounds the practice-based model as a social inquiry, with findings relevant to the community beyond the individual [p. 59]. The transference of an individual’s tacit knowledge is possible through practice research [Bye 2010, p. 213], which involves articulation through reflection and critique to make more explicit that which is known and experienced in situated practice.

My research methodology includes research for design and research through design [Downton 2003, 2013]. Christopher Frayling [1993] identified three different notions of research in art and design, which have been expanded through discussion and analysis by Peter Downton
[2013] to aid designers in the context of design research. Downton [2013] distinguishes research for design, research about design and research through design [p. 152/3797]. Each of these modes of design research has distinct features. Research for design involves any research a designer conducts during the design process that supports designing; this can include research for specific projects [p. 450/3797]. Research about design concerns historical and epistemological studies of design evidencing a wide range of issues about design, studies of designers, and designed objects [p. 824-1240/3979]. Meanwhile, research through design is distinctly knowledge a designer can access—it is a type of knowledge that is ‘embodied in the process of designing itself’ [p. 1242/3797]. In my research I predominantly perform research through design, however, also undertake research for design. The relationship formed between research for design, and research through design underpins my methodology.

A design research methodology emerges as uniquely symbiotic with the design practice it is formed through. Design is acknowledged to be complex to define and there are many interpretations of what design is. Design research evidences thinking about design from multiple and differing critical perspectives. Design researcher, Lucy Kimbell [2012] outlines that design is alternatively described as ‘a rational problem-solving activity (e.g. Simon 1996) or as something concerned with generating new ideas (e.g. Borland and Collop 2004) or creating meanings (e.g. Krippendorff 2006; Verganti 2009)’ [Kimbell 2012, p. 135]. Kimbell makes the case for considering design practice from the perspective of practice theories, to better understand what it is that designers do. This implicates understanding what design is, and the different meanings it takes, in specific contexts of individual practice. The practice of design from a research perspective involves designers conducting research through their methods of practice, and hence the meaning of design can take variable forms.

My understanding of design, which underpins my aim to challenge my conventional practice through this research, is aligned with notions of design that are oriented towards criticality. Speculative design involves the use of design to speculate on how things could be [Dunne & Raby 2013, p. 2]. It often involves imaginative responses, which seek to counter conventional practice and problems. Speculative design involves stepping away from industrial modes of production and their market places [p. 11]. Speculation involves an imaginative approach. The work of design academic Mads Nygaard Folkmann [2013] focuses on the relationship of design and imagination. In Folkmann’s philosophy, design can be regarded as ‘concrete imagination’ or ‘the material expression of a mental process’ [p. xv] where the activity of design is a ‘process and a medium for envisioning something new’ [p. 3]. This sense of drawing forth what is new is connected to the practice of fashion design; fashion designers are involved with looking for what is ‘next’ [Fox 2013, p. 7]. The search for what is new in the practice of design involves speculating about what might be possible and asking questions about current practice. In the context of my established pattern cutting practice, it can be difficult to design what is new if habits of practice are not regularly reviewed and renewed. My approach to design in this research shares affinities with critical design which proposes that ‘design that asks carefully crafted questions and makes us think, is just as important as design that solves problems or finds answers’ [Dunne & Raby 2001, p. 58]. By asking questions about the very forms and processes through which garments develop my design approach expands and my experimental pattern cutting practice emerges. This differentiates my design research methodology from dominant perspectives in pattern cutting that align practice with problem-oriented design methods and its research. I seek to ask questions of the pattern cutting process itself and my current practice, in ways that emphasise speculating through design.

My design research methodology is also formed through reflective practice. As a method to gain better understanding of tacit knowledge in practice, reflective practice is appropriate. Schön’s [1983] notion of reflective practice has been expanded in contexts of professional education and practice [McIntosh 2010, p. 45]. Through this expansion,
principles of reflective practice are emphasised to be interpretive; they provide one particular perspective on events. Through reflective practice, the more ordinary activities of practice, which might be taken for granted, can be surfaced for a deeper understanding and for improvement in practice [pp. 45-46]. Reflective practice acknowledges that there are many different types of knowing in practice [ibid.]. In practice research, problems can be multifaceted and emergent. Problems emerge and develop with the practitioner and the needs of the practice over time [Haseman & Mafe 2009, p. 214]. Therefore, in my practice-based research, I rely on multi-methods to gain a more thorough and rounded account of my practice. My research methodology evolved in an emergent way, to best account for the variables and layers of knowledge embedded within my practice and my reflection on it.

In practice-based research, the subjective position of the researcher must be acknowledged. This subjectivity is problematised in practice-based research, which relies on reflection; the researcher, as participator and also observer, is confronted through negotiating this dual role. For the researcher this is an uneasy position, which requires that individuality in interpretation is always foregrounded as a condition for the research. Gray & Malins [2004] outline that ‘knowledge is negotiated – inter-subjective, context bound, and is a result of personal construction’ [p. 21]. However, this dependence on subjective interpretation can also be a limitation of practice-based research if not ‘explicit and transparent’ [ibid.] In my practice-based research, this position caused me to reflect on my own role as both a participant and an observer. Through encountering this problematic as part of my research methodology, I acknowledge that it is both an unsettling and illuminating position to be in. Through asking questions of my own practice, I am required to acknowledge my own doubts that exist as a result of creative practice as a research enquiry. This experience of doubt is an important factor to consider for practice-based research, as more fundamentally, this involves questioning each and every part of what you do in practice, in ways that can complicate the more intuitive experience of trust in the process, which is implicit within an established practice.
1.5 Methods

This research is conducted through fashion design making processes including pattern drafting, fabric cutting and construction, stitching and drawing. In this research I work with materials including paper, cardboard, fabric meterage and thread. I use specialised and non-specialised equipment including pattern cutting rulers, measuring tapes, industrial sewing machines, hand needles, scissors, glue, pencils, pens, pins and masking tapes. Many different types of works have been produced in this research process, which include garment patterns, toiles, finished garments, drawings, etchings, textile works and textile samples. Digital methods including photography and video were employed to record my hand-based practices and to aid reflection on them. I used journals to record my research development, and my journaling techniques evolved many times. My journaling method developed throughout this research, to become a method I relied on to expand my critical reflection on tacit knowledge in my hand-based practices. I used writing in combination with my image and video archive, for reflection. The following gives an overview of methods used in my research for design and my research through design.

Research for design

This research was undertaken to establish a body of research for design. I used mixed primary and secondary research methods including observations of live butterflies and text-based research on the subject of butterfly metamorphosis.

Observational studies of butterflies

A site visit was made to the Kuranda Butterfly Sanctuary (June 2011) where I undertook observations of butterflies and their life cycle. Following this, butterflies were grown in my home-based insect enclosure, to enable closer observation.

Text-based research methods

Reading and critical analysis of text-based sources, including fiction and non-fiction sources.

Methods for reflection and analysis

Visual research methods included the creation of a photographic archive documenting the daily growth of the insects. Journaling was used to record observational drawings and notes. Creative practice was initiated through drawing using mark making. A blog was created as a repository for my observations, titled Becomingalepidopterist [Sgro 2011].

Research through design

The methods used for reflecting-on practice and reflecting-through practice have been mixed. This has included consistent use of journals and writing, together with photography and video making.

Journals

Note-taking and sketching were recorded during studio practice as making was undertaken. Notes taken during making are often fragmentary and reflective of working in the moment. I wrote up reflections following making and following reading, including drawn maps of concepts and works and how they are connected. In my journals I recorded ideas and visual processes for new or developing works, as well as completed works. I undertook visual documentation of my making.
processes, selecting key photographs, drawn plans and constructions to include in my journal, alongside my writing. I used my journal notes to develop creative texts, an activity through which I aimed to synthesise some of the ideas present in fragmentary notes.

**Video making**

I made videos to document the activities of my hands during various making processes. I made videos using collations of image stills of my drape developments. I uploaded my videos into an online repository: http://www.vimeo.com/donnasgro. The URLs for individual videos that I refer to are referenced in the text and also are referenced in the ‘List of Video Works’.

**Image archive**

I documented my processes and outcomes of making using photography. I referred back to this archive many times for reflection-on-practice.

**Conference presentations**

Regular conference presentations were made during this research, through which I tested ideas developing from my research in peer review contexts. I used these conferences to prepare writing for this thesis. Conference papers I have presented on topics from my research are:

University of Technology, Auckland.


Figure 1.4 Reflection through construction with project photography and video stills.
1.6 Project Design

The research was designed as an evolving ‘Project’ consisting of 5 smaller ‘projects’, titled Flatness Garments, Transitioning Garments, Chrysalis Shirts, Reconstructed Textiles and Dynamic Garments. Each of these projects was initiated by exploring metaphors from the study, Becoming-a-lepidopterist. Projects 1 and 2 include a series of garments and their patterns. Projects 3, 4 and 5 include a series of textile works and garments constructed without patterns. The project design aimed to allow for the reflection that occurred through practice to influence the development of experimentation in pattern cutting, and the development project to project.

Becoming-a-lepidopterist Study
In this study I aimed to establish a body of research for design that I could use to focus and direct the projects by generating metaphors for experimental pattern cutting. Observations of live butterflies and their lifecycles included a visit to a butterfly sanctuary, as well as learning how to source and grow butterflies in my home. These observations were supplemented with a wide variety of text-based research on the subjects of butterflies and metamorphosis. A series of creative works in the form of drawings were produced as a result of this observation and later made into a series of hand stitched etchings.

Project 1 Flatness Garments
Two series of garments and their patterns were produced in this project. Flatness Series I comprised five garments and Flatness Series II comprised seven garments. The aim of this project was to explore an alternative pattern cutting method, called flatness. As a result of this project, a higher attuning to spatial knowledge when pattern cutting enabled me to notice how I could design using the interior volume of the garment in alternative ways.

Project 2 Transitioning Garments
This project included two series of garments and their patterns. Transitioning Garments Series I included two garments and patterns, Transitioning Garments Series I Iterations included two garments and patterns, Transitioning Garments Series II included eleven garments and five patterns. In these series, I aimed to explore what methods could be used in pattern cutting to create spatial variation in garment outcomes, using the same pattern in alternative ways. This resulted from reflecting on the pattern in its capacity for variation, rather than using patterns as conventional tools for repetition.

Project 3 Chrysalis Shirts
This project included three shirts. In this project I aimed to explore how to represent the transitioning changes I had observed in the chrysalis formation. I designed a series of garments using the same pattern, which I aimed to alter, based on integrating a ‘growth’ that would change each time. In the process of this experimentation, pattern cutting was adapted by becoming more aware of the possibilities of working with the material of the shirts directly using stitched lines. This project enabled me to attune more closely to material knowledge afforded through making garments and how reflective practice can develop through slowing down, using hand-based practices such as stitching.

Project 4 Reconstructed Textiles
This project included two series of textile artworks. Dislocations included a series of three textile wall hangings and Cloud-scape was a single large-scale textile wall hanging. This project emerged as I searched for alternative ways to translate what I had learned through the butterfly study. I found that in this project a method of textile reconstruction appeared which I had used before. Through reflecting more closely on the way I cut and constructed for my textile design works, I developed a
better understanding of how I could translate these methods of working directly with materials to pattern cutting. I asked through this project, why do I need a pattern?

**Project 5 Dynamic Garments**

This project included a series of garments titled *Dynamic Dress I, Dynamic Dress II, Ikat Garment I, Ikat Garment II, Fractured Garment* and *Dynamic Morphotex*. *Dynamic Cutting* is my new method of pattern cutting resulting from synthesising the experimentation in the earlier four projects. *Dynamic Cutting* involves designing the surface and form of the garment at the same time, through activating material creativity and spatial creativity. This method forms my contribution to creative pattern cutting, through demonstrating how experimental pattern cutting can be enhanced using both material creativity and spatial creativity.

### 1.7 Thesis Outline

This section outlines the thesis design and each chapter breakdown, indicating where the projects will be integrated and where the literature and practice review will be found.

The thesis is structured in three main chapters, representing research for design (Chapter 2) and research through design (Chapters 3 & 4).

**Chapter 2**

This chapter introduces my study *Becoming-a-lepidopterist*, together with a review of theories of metaphor. I begin with how research for design is used in my practice and why butterfly metamorphosis was selected as a new area of self-education for my research for design. In this chapter I outline theories of metaphor that are expanded in my analysis of how I use metaphor in my practice. I introduce how metaphors are adapted from my butterfly study and focus through the notion of dynamic form, to facilitate experimentation in pattern cutting.

**Chapter 3**

This chapter is focused on how spatial creativity is developed in my pattern cutting practice, through two projects, *Flatness Garments* and *Transitioning Garments*. Using the metaphor of the garment as a transitioning insect body, the spatial variability in working between 2D and 3D in pattern cutting is enhanced in these projects. In *Flatness Garments* I begin with experimentation using flatness pattern cutting, and develop closer attention to the internal volume of garments that is activated through this method. The spatial variables of garments are further enhanced through using their planar qualities. Spatial creativity is further explored through the notions of variation in the pattern and enhanced internal volume of garments—made possible through expanding paper based practices, combined with pattern cutting.

**Chapter 4**

This chapter is focused on how material creativity is developed in my pattern cutting projects, expanding upon the spatial creativity already encountered through the previous chapter. In this chapter I detail how tacit understanding of materials was formed through my textile design practice, and in turn informs the development of cutting methods for garment design. I detail my new method of cutting, *Dynamic Cutting*, and how increased reflection on and through practice was enabled by slowing my practice and expanding how I integrated hand-based techniques, while designing garments using this method.
Chapter 2

BECOMING-A-LEPIDOPTERIST
The butterfly metamorphosis study
2.1 Research for design

At the start of this Ph.D. research I felt creatively inhibited by the conventional pattern cutting methods I used in my fashion design practice. I was unclear, however, exactly why or how to effect change in my practice, due to both the complexity of activities involved in the creation of my fashion garments and the repetition of methods used to create them. More intuitively I suspected that challenging pattern cutting techniques in some way could prove insightful, as this practice was applied repetitively rather than creatively.

To consider how to challenge pattern cutting in my practice, I decided to experiment with expanding a creative process I already used when designing. While it was previously applied to assist in developing my drawn designs, I now aimed to transfer this process to see if it could be used to generate new cutting methods. Each collection I had designed through drawing methods in my conventional practice began with developing a novel area of research for design that I could use to inspire the development of new ideas. This involved self-education, which involved expanding my understanding of cultural theories and practices through research methods including reading and image sourcing. I preferred to research outside of the field of fashion design, to evolve concepts from ideas I encountered in alternative artistic contexts. This was a method I was trained in through my undergraduate years in fashion and textile design at the University of Technology Sydney, where the emphasis was on evolving design through research outside the fashion field. This method also enabled me to adapt my original training in fine arts history, theory and philosophy, as I often undertook new research using artistic or philosophical ideas and works as primary sources of inspiration. Downton [2013] identifies this type of research for design, including reading theoretical works from other fields related to the development of an individual's designing in a general sense [p. 494-5/3797]. I consistently use such research to develop my knowledge of cultural theories and practices through self-education.

In my conventional fashion design practice, my research for design was used to inspire the development of a new collection concept and narrative. Therefore, I focused the translation of this research through particular projects, defined as new collections. I found through undertaking novel research for each collection that I could establish a focus that both inspired and directed my design development consistently and cohesively. I used my research to create concepts that underpinned the selection of distinctive shapes, silhouettes, colours, patterns and narrative components that differentiated each collection. These informed the garment design outcomes that I drew while referring to my conceptual materials for guidance. In my design process I relied on analysing information from the sources I read and worked up concept development using keywords. I used these keywords, alongside images, to ground my impression of this research for personal interpretation through design. I avoided translating too directly from the artists or movements I researched; my aim was not to reproduce particular works or ideas through copying or directly translating them. I used this research instead to inspire and inform my design process as a catalyst; this is different to cases in fashion design where a designer aims to pay homage to an artist, as evidenced in the YSL Mondrian Collection 1965 [Meek 1987, p. 18]. I suspected that by expanding my existing creative process using a new body of research for design, I could develop experimental pattern cutting through converting this method from drawing to pattern cutting.

I developed my new area of research for design through my study of butterfly metamorphosis. I called this study Becoming-a-lepidopterist, as it was undertaken using primary research with growing butterflies (I became a lepidopterist as much as any other hobbyist), and secondary research on the subject of butterflies and metamorphosis. Primary research involved observations of butterflies by visiting the Kuranda Butterfly Sanctuary and then growing butterflies in my home. My observations of butterflies were documented using photography, drawing, and note-taking. Secondary research on butterflies and metamorphosis covered a wide variety of sources, selected from literature, philosophy,
entomology, natural history, ecology, biology, mythology and artistic contexts. Hence my research for design involved a multi-method approach, where qualitative research methods included direct observation and documentation of butterflies, combined with contextual analysis through reading from a variety of sources across disciplines. Downton [2013] identifies that as a way to inform designing, this type of reading can prompt discovery in ways that are unanticipated. He notes that ‘valuable ideas often result from misreadings as well as intentionally wayward readings and unusual juxtapositions’ [p. 495/3797]. I aimed to develop an in-depth and varied understanding of butterfly metamorphosis through consulting multiple source types, which I could use to create new concepts for pattern cutting experimentation through my personal interpretation of this data.

My research for design also involved the study of garments by specific fashion designer practitioners. Research focused on using exemplars or particular ways that designers do things is considered by Downton [2013] to underpin research for design in a general sense, not just specific to a project [p. 516/3797]. I regularly undertake this type of research, and through my practice continually build my knowledge of garment pattern cutting and construction using insights from this investigation. Where possible, I seek garments out to look at and inspect them directly. This is not always possible with design exemplars in fashion. There is, additionally, minimal documentation of the methods used by individual designers to show how creative cutting is practised or developed experimentally. Hence, usually, these processes need to be read from existing garments and photographs of them. I, therefore, conducted this research mostly through literature searches using monographs of designers and exhibition catalogues. For the Flatness Garments project, for example, I undertook research focused on flatness garments, as they appear in other design collections. I garnered this information from text-based sources where the focus is mediated by the author, not the designer. It was through studying the images of these garments that I could draw the most useful information relating to creative pattern cutting, through what I could see of each garment in different cases. For example, in the context of the flatness garments by Rei Kawakubo, the exhibition, Future Beauty: 30 Years of Japanese Fashion, toured to Australia, and I was able to view and photograph the actual garments and use this information together with the catalogue [Fukai 2010b]. There are limitations in these research methods as the actual physical garments contain material knowledge which can be hard to interpret from a distance. Therefore, by experimenting with flatness garments directly, I can gain a better perspective on this method, through my first-hand experience using pattern cutting.

In this Ph.D. research, I undertook my research for design through a developmental process. Initially I began with a broad range of research, which provided me with an overall feel for the direction I might take in design. To focus and develop my research further, I frequently revisited my sources to gain more specific insights and clarity as my project evolved. My research for design, therefore, evolves many times, as particular ideas become critical to revisit at different times in the research project, to progress my design experimentation. My research for design process is therefore iterative and at many times I return to either expand or refocus my understanding through further reading or review of images.

At the outset of this Ph.D. by project, I aimed to explore how to change my practice of design and pattern cutting. This exploration of change in my practice involves my aim for a structural change in my practice, not merely a novelty that could direct a specific project. Therefore I intended to use my research for design differently than I had in past practice. As such, this research for design became more critical to my methodology for the Ph.D. Through it I identified overarching principles that guided my selection of research methods, to enhance the evolutionary and emergent qualities necessary to facilitate change in practice. I anticipated that by choosing to research butterfly metamorphosis and through my study of this phenomenon of transformation, I might be able to effect a lasting change in the structure of my practice to improve it going forward. As suggested by Downton [2013] I
therefore anticipated using my research for design to enhance design and find better ways of approaching design [p. 468/3797]. I aimed to facilitate this improvement by using the analysis of my research for design, combined with reflection on my practice of design as it was already structured, to progress new design experimentation using pattern cutting.

Downton [2013] claims that the way designers interpret research involves representing it in a variety of media and forms and that ‘the mental steps vary from designer to designer and could be said to remain mysterious’ [p. 746/3797]. In my research, I establish that the use of metaphors is the specific way I can translate my research for design, into designed outcomes. Hence, alongside the transformation of my practice by the end of this process, a contribution of my Ph.D. research is to offer a new way to translate research for design through to materialised outcomes, using metaphors. As a way that translation is enabled, metaphors remain an underdeveloped and underexplored strategy for explicating tacit knowledge. Metaphors assisted me to make better sense of how my design process could be verbalised and shared, through the explicit reflection and theorisation on how I used my research on butterflies and metamorphosis for designing. This finding regarding metaphors is one of the key contributions my research makes to design practice research.

In the Ph.D. project, different experiments with pattern cutting were directed by testing ideas developed from my *Becoming-a-lepidopterist* study. My experimentation with pattern cutting in the project aimed to challenge habitual thinking formed through my established practice of flat pattern cutting and drape. As the project proceeded and reflection occurred, a narrower focus formed through reflecting on my tacit knowledge of practicing by hand and using these reflections to guide experimentation. A more explicit understanding of how I used a strategy of metaphor to translate concepts from my research for design and test them through the spatial and material practice of pattern cutting formed as a result of the project. This more explicit understanding of how I used metaphor already, assisted me to understand how I could further utilise a strategy of metaphor in my practice.

2.2 Metaphor in pattern cutting: a crumpled piece of paper

Once [Kawakubo] gave us a piece of crumpled paper and said she wanted a pattern for a garment that would have something of that quality. Another time she . . . talked about a pattern for a coat that would have the qualities of a pillowcase that was in the process of being pulled inside-out . . . the essence of that moment of transition, of half inside, half out. Unnamed patterner, 1990 [Bolton 2017, p. 47; Sudjic 1990, p. 35].

At some point in the past I encountered this description of Rei Kawakubo’s working process from one of her pattern cutters. This narrative resonates for me, guiding and sustaining the interest I have in the work of Kawakubo and Comme des Garçons. Found within the garments of Comme des Garçons is a sustained dismantling of all that is conventional in fashion, with continual creative experimentation, in the spirit of the avant-garde [Sudjic 1990, p. 11-13]. The company is renowned for its creative cutting.

What strikes me about the statement above from the pattern cutter is how it seems that metaphor is used to communicate the intention of a designer, who has been described as taciturn [Sudjic 1990, p. 31]. Metaphor is not something explicitly discussed by Kawakubo; this is my interpretation. The use of metaphor, however, seems to be implicit in the way Kawakubo intends her work to be received; she doesn’t want to have to interpret it for others, but instead allows her work to provoke multiple readings, which destabilize any one particular, literal interpretation. The way that Kawakubo describes the process of working with her pattern cutters further relates this design method which seems to rely on metaphor as a particular communication strategy:

I express a concept to the patterners in words or through nuance. Design starts with how each of my staff interprets the concept. The patterners are in fact designing [Shimizu 2005, quoted in Bolton 2017, p. 48].
Kawakubo is careful to distance herself from agreeing to specific interpretations of her work [Bolton 2017, pp. 17-23] while confirming her motivation is the continual creation of what is new; ‘the only way forward is not to look back’ [p. 18]. I use this example to suggest that metaphors enable a means of communication between explicit and implicit knowledge, which is critical in practices where concepts are communicated and materialised using tacit knowledge, such as in pattern cutting.

2.3 Theories of metaphor

In all its modalities, metaphor is a creative form of expressive transformation that exceeds representational communication by providing what it is incapable of articulating adequately in itself [Singer 2011, p. 149].

In my research I have consulted sources on theories of metaphor, which assists me to both understand and articulate how metaphors operate in my practice. A metaphor in everyday understanding is used to describe a figure of speech, or symbol, through which something is substituted for something else that is analogous to it, but not the same literally. The study of metaphor is traditional in linguistic and literary contexts. However, contemporary metaphor theories expand the application of metaphor through evidencing that its relevance extends to any field of cultural inquiry. My research demonstrates that metaphor can be useful in pattern cutting to aid in the articulation of tacit knowledge, which is embedded in hand-based practices that rely on communication through demonstrations or technical steps. The creativity of pattern cutting requires more evidence of how individual practitioners use their tacit knowledge to experiment with finding new expressions in garment design and form. In my research, I have found that a more explicit use of metaphor can both aid processes of experimentation with, and articulation of, tacit knowledge.

Conceptual Metaphor Theory (CMT) was developed by George Lakoff and Mark Johnson [1980, 2003] and redeveloped by Lakoff [1993] as the Contemporary Theory of Metaphor (CTM) [Ruiz de Mendoza Ibanez & Hernandez 2011, p. 161]. This theory posits metaphor as a fundamentally cultural phenomenon that structures human activities, thoughts, perceptions, and behaviour more pervasively as cognitive [Lakoff & Johnson 2003, p. 3]. Metaphors are implicit in the thoughts and actions of everyday life and are not only associated with language, as is commonly thought [Lakoff & Johnson 2003; Lakoff 1993; Ortony 1993]. The way we interpret the world profoundly connects with the use of metaphor:

Metaphor is principally a way of conceiving of one thing in terms of another, and its primary function is understanding [Lakoff & Johnson 2003, p. 36].

Metaphors are often encountered in systems; forming chains of metaphorical concepts, as well as appearing in single instances. As an example, *time is money* is a common metaphor which is connected to associated metaphors such as *you are wasting my time*, *is it worth your while*, *do you have much time left* [p. 8] and many others. This chain of metaphorical concepts structures the notion of *time* consistently, as a commodity. Moreover, this understanding of *time* relates to a particular cultural understanding; *time* as it is experienced in post-industrial societies. This is not the only way to understand the concept of *time*. However, it demonstrates its connection to the values, attitudes, and experiences of a particular culture. Lakoff and Johnson identify consistency between systemic metaphors that underpin a culture and the values of that culture [p. 22]. When I reflected on the structure of design and pattern cutting in my practice, I found that there was a reliance on values of efficiency, of saving time, which directed how pattern cutting was used in my practice. Reflective of the systemic distribution of metaphors the notion of efficiency is encountered in many different ways in the practice of fashion design and pattern cutting. Efficiency structures the very selection of flat pattern cutting, for example, as the most timesaving pattern cutting method. I certainly facilitated the use of this method for the shortcuts it enabled in materialising my garment designs.
It is evident when analysing conventional practices of pattern cutting connected to mass manufacturing, such as flat pattern cutting and drape, that industrial values continue to be strongly associated with pattern cutting. Commercialisation of the garment industry and factory systems underpinned standardisation of fit for mass-manufacture [MacDonald 1997] and continues to be thoroughly integrated into industry practice. Metaphors involving efficiency and repetition are littered throughout pattern cutting texts, pattern cutting research and industry practices. These metaphors are connected to the industrial paradigm which continues to influence the way that pattern cutting is understood. To increase creativity in pattern cutting, however, requires challenging these more fundamental values and beliefs which structure conventional pattern cutting practice. It is not easy to see how to circumnavigate habitual values so embedded within particular practices that they appear to be intrinsic qualities. Lindqvist [2015] has demonstrated, however, how the static body is one such convention connected to the industrialisation of pattern cutting that can be challenged by reconsidering first principles through foundational research in pattern cutting. Much of the current research in pattern cutting is focused on how to make improvements for commercial benefits. This is evidenced in different ways through research in pattern cutting that focuses on issues of body size and customisation, where target customers are integral. For example:

The extreme variation in body sizes, body shapes, and body postures in the population, the difficulty of clearly identifying the target market for the company and of finding valid data on the body size and shape of the target market, the complexity of categorising body proportions, and the complicating factor of variations in fit preference by customers are all issues that need further study [Ashdown 2014, p. 25].

Contemporary industry practice remains connected to industrial thinking, which individual designers need to find ways of negotiating if aiming to challenge conventions in pattern cutting that might open up more creative possibilities and alternative values. My research evolved to consider how alternative metaphors might be able to expand creativity in pattern cutting. Through expanding my use of metaphors and explicitly reflecting on what metaphors were already embedded in my practice of pattern cutting, I was able to discover ways to alter my practice.

Metaphors are not the same as descriptions. They do not aim to give an account, interpret or explain something without ambiguity. In my research, my use of metaphor is made through a personal and individual construction. I choose and select what I suspect might be useful in the generation of the metaphor, and I use it to experiment with alternative ways of practising. However, I do not hold the metaphor to account; I realise it is a strategy which enables me to interpret my research for design in an imaginative way. It is not a strategy capable of revealing a true or false path. There is, therefore, a selective usage of metaphoric components and layers of metaphors that are always partial and impressionistic; I get a sense of them and how I might make use of them. I try out various methods for translation, before being able to harness the full power that the metaphors enable for the development of experimental pattern cutting practice. Hence my research process can be understood as a way of creating partial constructions to test with, which makes sense in the final resolution of the project, that is, through my method of Dynamic Cutting.

This flexibility inherent with the use of metaphors is explained through CTM as a process of highlighting and downplaying elements when a metaphor is created. Metaphors are considered to be partial constructions that are used to build coherence in meaning and to make sense [Lakoff & Johnson 2003, p. 154]. They are not exclusive, nor exhaustive, and remain flexible. There are many instances of metaphoric concepts that are so familiar that they are tacit; we incorporate them into everyday speech and daily activities. It can be therefore difficult to disassociate literal and metaphoric meanings from the language we use every day. Moreover, it can be difficult to understand cultural exchanges without relying upon metaphor. The metaphors I come to use to experiment with in my pattern cutting practice relate to butterfly metamorphosis; I use them to find ways of translating
this concept, as I understand it, through my research for design into material garment outcomes. This requires translation across different media and forms that involves different types of knowledge, formed through visual, tactile and emotive sensory engagement.

Theories developed since CTM further expand the understanding of metaphor beyond linguistic contexts. Metaphor enhances our understanding in everyday practices and is deeply embedded in our understanding of the world around us and our place within it. Kövecses [2005] argues that metaphor can exist in multiple domains simultaneously, linguistic, conceptual, social-cultural, neuronal and bodily [p. 8]. Metaphor can appear in various guises, in both universal and individual forms [ibid]. Metaphor is acknowledged to represent complex cognitive phenomena and can be understood as a mapping system [Ruiz de Mendoza Ibanez & Hernandez 2011, p. 169]. Additionally, metaphors are known to enhance understanding through imaginative strategies [Gray 2004, p.2]. Hence metaphor, as part of our daily experience, is implicit in our actions and our thinking. Further, a strategic use of metaphor can facilitate creative thinking by activating imagination.

These theories of metaphor translate to the design studio and I suggest that research concerning how fashion designers use metaphors when designing and cutting garments can be expanded as an area for future research. In design research, empirical studies involving the use of metaphor in the design studio with architecture students [Casakin 2007, 2011, 2012] has shown that the use of metaphor as a cognitive strategy in design problem solving both supports innovation in design and encourages creativity. Casakin [2012] states:

In design, metaphors are viewed as potent problem solving heuristics that can help think about design situations anew [p. 329].

Metaphors open up possibilities of interpretation; as flexible hermeneutical devices, they can be used to give an account of the design process which is often complex, comprising many interacting parts. Metaphors, therefore, have explanatory powers: they can 'evoke new ways of seeing things' [Snodgrass & Coyne 1992, p. 65]. In my research, I use metaphor as an explicit strategy to develop experimental pattern cutting practice, which involves complex engagement with spatial and material knowledge. The use of metaphor also enables reflection on this tacit understanding formed through pattern cutting practice.

2.4 Morphotex Dress

A specific experience led me to select butterfly metamorphosis as a new topic for my research for design. It is important to mention this experience, as it continues to influence my thinking about future possibilities within fashion design for innovation in practice. My work as a designer is most well known for my use of Morphotex fabric. Morphotex is a biomimetic fibre which was developed by Teijin Fiber Japan. The biomimetic qualities of the fibre were produced using a nano-technological process through which the natural iridescence of a butterfly wing was translated into the design of the textile fibre structure. This innovation was made through translating the structural colour found in a Blue Morpho butterfly's wing, into a fibre. In structural colour, a series of nanoscopic layers in the butterfly scales form a distinctive matrix that produces iridescence. In the Morphotex fibre, the structural colour was adapted to the design of the fibre to create innovation in colouration. Structural colour avoids conventional pigment dying processes which are known to create toxicity in the natural environment. Hence the Morphotex fibre is considered to be an innovation with sustainability benefits. I designed a series of garments using Morphotex and presented them at Japan Fashion Week in Tokyo (A/W 2009/10). Since this time, my Morphotex garments have continued to be exhibited around the world and are included in permanent collections of the London Science Museum, Taiwan Science Education Centre and Biomimicry Europa.
The international reception of my work featuring Morphotex shows that there is something compelling in the transfer of knowledge from nature to design, experienced through the relatively familiar form of a dress. The way this dress has been able to represent a complex process quite simply, continues to underpin my fascination with butterflies and how they could be used to tell significant stories about environmental issues. This, I realise, is also outside of the scope of my Ph.D. project. My interest in butterfly metamorphosis and design methods inspired by natural systems however remains integral to inspiring my practice as a designer. Morphotex fabric inspired me to design more imaginatively and from a perspective that involved taking notice of some of the smallest creatures around us. This experience has profoundly shifted my perspective on design and how it can engage with changing our perceptions of the natural world and our place within it.
What struck me and led to my choice of butterfly metamorphosis as a research focus, is how someone had come up with the idea in the first place to turn a butterfly into a fibre. This transformation of a butterfly into a fibre seemed magical, impossible, illogical, yet here it was. I had held the butterfly metaphorically, as a piece of fabric in my hand, cut it and reformed it into garments. I wondered, how does an idea such as this come about, and more abstractly, how does an idea come to have the substance of a material outcome? With the initial question of what else can a butterfly be turned into in mind, I began this research with an idea to explore biomimicry as a possible method for transforming my pattern cutting practice. What emerged instead is a more focused understanding of my fashion design practice and its metaphoric strategy for design.

Initially my research aimed to explore how a methodology such as biomimicry could be developed for a fashion design context. This purpose formed the focus for an early conference paper developed from this research, 'Fashion Practice and Biomimicry' [Sgro, 2012]. To me, the very idea that a butterfly could be turned into a fabric was such an astounding concept. I found that this idea kept drawing me back, just like the butterflies that I have since become much more familiar with—they continually circle, returning to the same spot. So I kept returning to this profound idea of a butterfly turned into a fabric.

As I reflected more on the experience of using Morphotex, I realised I had missed an opportunity in pattern cutting. Instead of aiming to match the innovation of the textile with an innovation in cutting, I applied the same methods of cutting to this fabric as I had to any other. I reflected that there seemed to be a disconnection between material creativity and spatial creativity in my practice. I do not think this was always the case, but this particular experience led me to reflect on this separation between materials and my methods of pattern cutting much more closely. While I aimed to change my methods of pattern cutting, the butterfly prompted me to self-educate to discover if, through researching butterfly metamorphosis, there might be some way to transform this inspiration I took from Morphotex further, to challenge my practice of pattern cutting.

2.5 Kuranda Butterfly Sanctuary

My study of butterfly metamorphosis began with a visit to the Kuranda Butterfly Sanctuary, north of Cairns in QLD. Not quite knowing how best to study butterflies, a visit to the sanctuary seemed like a good place to start. I aimed to find a way to become closer to butterflies and to see what I could learn about them through direct observations. Butterflies, while beautiful, seemed mysterious. This perception was only reinforced by my more intimate experience with butterflies at the sanctuary. The butterflies flitted in and out of view, sometimes high within the enclosure, at times skimming more closely towards visitors, or landing on them. Their behaviour enabled brief encounters, as they seldom stayed still, travelling in their distinctive style of movement, which I learned is called jinking. Their beauty is beguiling. However, it is constantly out of reach; it is beyond touch. I realised I wanted to get closer to them.

Although the butterflies were the main attraction at the sanctuary, part of the reason I travelled to visit was because the other life cycle stages, including caterpillars and chrysalides, were on display. In the sanctuary, however, my observations of the caterpillars and chrysalides displays were partial and impressionistic. It was hard to see the insects in detail. They remained at a distance behind glass and flyscreen mesh, which impacted easy viewing. Hence there were issues with clear lines of sight and proximity. However, what little I felt I could gauge about these stages of the life cycle, I found particularly intriguing, despite this distance. My thoughts about the chrysalides began to extend into thinking about how to design garments, using analogies.

The strange, amorphous, blob-like forms of the chrysalides protect the insect that is undergoing a profound transformation. A total restructuring of the insect body occurs through which a transitional stage of liquefaction dismantles and reconstructs...
Figure 2.3 Photographs of butterflies I took at Kuranda Butterfly Sanctuary 2011. Trying to catch a feeling for the Birdwing.

Figure 2.4 Kuranda Butterfly Sanctuary, chrysalis drawings and photograph. Chrysalis—what is going on in there?

The caterpillar (larva) transforms into the butterfly (adult) through the intermediary of the chrysalis (pupa). Since Darwin’s [1859, 2003] theories of evolution, metamorphosis is described in evolutionary terms as a life cycle of growth, which maximises the chances for the survival of butterflies by diversification in their larval and adult forms [Truman & Riddiford 1999; Wigglesworth 1970]. This process, however, does seem magical and since earliest times butterflies are associated with wonder. I started to wonder how I could use these insights for design experimentation. How could this study of butterflies inform me to design garments differently through my pattern cutting practice?
2.6 Growing butterflies

The experience of visiting the sanctuary led me to conclude that another method was required to study the life cycle of insects if I aimed to get closer to them. Moving the butterfly metamorphosis study forward, I investigated how to grow butterflies at home. This research involved locating both Australian butterfly and food plant suppliers. Through this research I found that butterfly growers supply schools with life cycle kits for observation in the classroom. Alternatively, supply is mostly for special occasion butterfly release, such as weddings. Hence, the species I could source to grow at home were limited to these markets. It was relatively easy to set up the life cycle enclosure in my kitchen at home.

Figure 2.6 (opposite) Melbourne Zoo 2017.
Butterfly—after all this time, you remain an enigma.

Figure 2.6 Preparing to welcome guests into my home.
The first butterfly species I raised was *Hypolimnas bolina* (*Common Eggfly/Varied Eggfly*), and the second was *Danaus plexippus* (*Wanderer*). I observed and recorded daily changes in the insects through photography, drawing and reflective note-taking. I edited the photographic record and published a daily account through my blog [http://becomingalepidopterist.tumblr.com]. I referred to this archive often throughout the project development. The entire photographic record is extensive, with more than 6000 photographs. In the process I became intimately more familiar with the nuanced lives of these insects. There are subtle, daily variations in activities, behaviours and appearances.

2.6.1 Reflection: *Common Eggfly* observations

Initially I aimed to observe the growth of the insects daily to see what I could learn about their life cycle through close observation. At first I focused on drawing directly from life, observing the caterpillars as they ate, slept or otherwise hung around on the plants, writing short notes, while taking photographs. I started by drawing in colour, as realistically as much as I could see. I realized quite quickly that magnification was necessary, therefore, I switched to a macro lens and supplemented direct observations with details observable through the lens. The drawings became a mediated process, where magnification was key to observing small details.

Caterpillar

Through close observation it became apparent that many changes were happening daily and these tiny insects were transforming through growth. What at first seemed somehow magical regarding the metamorphosis, becomes intimately more nuanced and complex,

*Figure 2.7* (opposite) *Common Eggfly*, selected photographs from *Becomingalepidopterist* blog.
when contextualized within the life cycle. The caterpillar undergoes four stages of molting (instars) before the fifth final shedding through which pupation occurs. Each shedding I witnessed was fascinating; the caterpillar can change not only in size but also in behaviours and appearance [Marent 2010]. I remember watching this process intently and revisited it often by looking over the photographs. I became attuned to locating caterpillars that were about to shed, their skins stretched tight like they were wearing a jumper that has shrunk in the wash. They appeared puffed and firm, with a head that suddenly looks too tiny. These observations assisted me to understand that transformation is part of the everyday life of the insects. Others identify the caterpillar to be the miracle of metamorphosis [Todd 2007, p. 260]. I wondered how this shedding could be useful for design explorations. I started to contemplate if the form and surface of the insect body could be considered analogous to the body and garment in my pattern cutting practice.

Chrysalis

Something happened when the chrysalis formed which changed my understanding again. Suddenly, there was waiting. After daily observations of the insects as they moved around, a more profound transformation was occurring inside the chrysalis, but it was invisible. I could not observe it directly. What was happening inside? As a response to this change in what I could see, my methods changed also. This waiting initiated imagining and this started to materialise in my drawings. The stillness of the chrysalis demanded a slower and closer proximity of observation. I started to see much more minute physical details while imagining the changes that were going on inside. I focused more on the surface of the chrysalis and how it revealed aspects of the form of the body. I could almost see the butterfly forming inside, by tracing the lines on the chrysalis surface. In this way, I continued
A stylistic change in drawing occurred during the observations of the chrysalis. Through looking, I analysed the subtle undulations of the surface of the chrysalis form—the way light and shadow fell differently to reveal subtle contours.

A result of this slower interaction with the insects and closer attention through looking was represented through a stylistic change in drawing. I developed halftone drawings that relied on making a series of short, repetitive lines. This method of drawing allowed an observational tracing of the subtle undulations in the chrysalis form, as if I was touching it with my fingers. I had not in the past drawn in this style, but found it became a useful technique that stretched the amount of time taken to observe. Through this drawing method, I dwelled longer while looking, contemplating and using my hands to make small, repetitive gestures. I made marks that corresponded to the details in the form of the insects, however, translated through a 2D rendering technique. Reflecting upon these drawings later, I realised that they record thinking—the use of my hand, translating from 3D to 2D, something that I am constantly doing when designing through pattern cutting.

The daily experience of waiting and observing such a profound stillness in the insect prompted a change in my methods of reflection. Rather than literally representing what I could see, I developed a deeper level of reflective thinking that anticipated how I could repurpose what I was observing for design exploration in a fashion context. This thinking is not obvious—I do not mean that these drawings are garment designs. The drawings, however, mark a particular change in thinking for design, specific to this 2D to 3D transition, which started to evolve with my observations.

By drawing such tiny details I observed the surface of the chrysalis more closely, noticing how these small undulations together constituted the form of the chrysalis. Through drawing and using my hands in such a way, I thought about how I could potentially...
translate what I was observing and learning through Becoming-a-lepidopterist to pattern cutting. Through drawing that involved marking lines and divisions, I realised I was imagining and anticipating how to create seam lines in a garment. Where do I divide, and where do I cut? This was a significant realisation involving a new understanding of how I use spatial knowledge in my practice. My dissatisfaction with my conventional practice of pattern cutting and the process that had led me here had now incited change within my design thinking. I could imagine differently how to cut and shape sections in the surface of a garment form.

Through this realisation that transpired through understanding how the activity of drawing can be useful to redirect my practice, I started to explore thinking through drawing, enabling a correspondence between butterfly metamorphosis and fashion design methods, derived from the form of the chrysalis. I start to think of seams through analogy. They become inherent splits or fractures, breakages which through their reconstruction enable the design of specific form and surface qualities in a garment. These analogies later become apparent in the project, as I develop a more highly attuned awareness of how I work between 2D and 3D methods. At the time of drawing this method of translation was tacit. Later, after reflecting more, I could better recognise and account for why the drawings were so important in the context of design through pattern cutting. Through drawing I initiated methods of translation, based on direct and focused observations of the interrelationship of the form and surface details of the insect bodies. This required that I used my hands and repetitive gestures, which in turn, stimulated deeper thinking for 2D to 3D translation.

Figure 2.11 Drawing the chrysalis formation to forward think garment cutting.
Emergence

I noticed the emergence of the first butterfly by spotting changes in the physical appearance of the chrysalis. I was now so finely attuned to noticing small details, that this change felt exciting. Suddenly, the chrysalis, which was brown like a dried leaf, darkened. The colour of the butterfly wings became visible. In time, the chrysalis cracked and the butterfly emerged. Afterwards, the chrysalis becomes just another discarded skin; a brittle, cellophane-like layer is all that remains. The butterfly emerged heavily as a sleepy, dark brown blob with crushed, crumpled wings. The abdomen swung and then began to leak fluid, while the wings slowly expanded, unfolded and extended. The butterfly pumped air into the veins of the wings, which continued to expand and open until they fully extended. Then, the butterfly was still, waiting for its exoskeleton to harden. Occasionally its wings opened and closed until it was ready, miraculous and beautiful.

2.6.2 Reflection: Wanderer observations

I continued to use the methods of daily observation initiated in the first butterfly study throughout the second butterfly study. I continued drawing with the halftone method, as it afforded me time to think more carefully through what I was observing, and how to translate my new experiences with butterflies to 2D systems of representation. I enjoyed the drawing process and the regular activity of spending time with it daily. Through drawing, I closely observed and thought through what I noticed in the insects as moving 3D forms. The mark making expresses a visual rhythm and pattern; it promotes a rhythmic, contemplative, physical activity of small movements, which results in a series of marks on the page. These marks translate the subtle shaping that I noticed in the surface of the insect body, in preparation for 2D pattern translation.

Figure 2.12 Photograph of the first Common Eggfly butterfly released, later found in local park. Butterfly, my friend, see you later.

Figure 2.13 Wanderer caterpillar, halftone drawing.
Figure 2.14  *Wanderer* caterpillar, halftone drawing.

Figure 2.15  *Wanderer* chrysalides, halftone drawings.
Spending time developing this repetitive drawing technique allowed a slow method of making to emerge in practice. Slowness during making had not been present in my conventional practice of fashion design for a very long time. Ordinarily, I aimed to work very quickly, using my hands to achieve predetermined outcomes. Here, instead, I found myself dwelling through drawing which enabled me to reconsider how I use my hands and the value of thinking through handmaking. The slowness of this activity allowed me to think more carefully and thoroughly while using my hands somewhat distractedly. The repetitive nature of making these marks signals the development of a meditative mode of making in practice. The slowness involved in sustained hand drawing, and subtle effects of time and reflection, is understood to be essential for both developing and absorbing ideas [de Freitas 2010].

I reflect further that the drawings are a record of observational time, rather than a record of observations per se. This observational time with the insects is critical for developing a deep and more personal connection through *Becoming-a-lepidopterist*. I allowed this process to be enriched by slowing down and spending time contemplating while mark making. This slowness which is enacted through repetition enables dwelling, and a different sense of time is encouraged to develop in the process.

The experience of thinking through handmaking, which is initiated in these drawings, emerges later in hand stitching. I did not connect these activities at first until I realise that again, it is the effects of dwelling with this activity and slowing down that is most important and common to both hand drawing and hand stitching. The process by which my stitching developed is also useful in revealing something more about how I design through pattern cutting. When I slow down during these fashion practice processes, which often involve many trials and errors, likewise my thinking becomes apparent. These trials and errors in translating ideas through pattern cutting and construction is what the series of experimental works, *Chrysalis Shirts*, relate.

### 2.7 Research about butterflies and metamorphosis

In the butterfly we might find a correspondence between things, a bridge between the sciences and the humanities, a biological organism as well as a cultural symbol in which reason intersects and overlaps with imagination, until it becomes difficult to disentangle the two [MacRae 2007, p. 20].

There are many different insights I could relate from my study of butterfly metamorphosis, which would form a separate written work entirely. It became necessary to focus on the most critical ideas that impacted my understanding of butterfly metamorphosis as a vigorous interdisciplinary concept. I am certainly not the first designer to take inspiration from butterfly metamorphosis and will not be the last. I realise there are too many ways to mention how butterfly metamorphosis is adapted symbolically by artists and designers and this doesn’t form a meaningful component of my analysis for this research, as I sought to understand more personally, how to adapt my research for design in my practice.

Butterflies and the concept of metamorphosis are hybrid subjects. They cross between fields of science and artistic production. Butterflies have an abundantly rich history of cultural symbolism, and their representation can be traced to the times of human pre-history where they were represented on carvings during the late Paleolithic period pre-10000 BC [MacRae 2007]. In the Neolithic period they were used to represent the bird goddess—the symbol of creation, and their image was symbolically interchangeable with that of birds [Howse 2010]. Butterflies, since their earliest representations have been used to symbolise the most profound transformations of the soul, through death and rebirth [Howse 2010; MacRae 2007]. As Christianity developed, the butterfly and its stages of development, including the caterpillar and the metamorphosis, came to represent the journey of the soul and salvation, connecting the life of Christ with the ultimate transformation through resurrection [MacRae 2007]. I mention this history not because these details are particularly
critical to my pattern cutting experimentations, but to evidence how butterflies have been used as symbols to convey an understanding of the most profound transformations in life. I anticipated through using butterfly metamorphosis that this subject could, therefore, be a useful design research area, since these expansive interpretations of the butterfly’s symbolic value underpins richness in this subject, described as ‘wide-ranging and ephemeral as the animal itself’ [MacRae 2007, p. 13].

Metamorphosis is a process of change through which something undergoes a complete transformation. As such, it involves a change in form, appearance or identity. Metamorphosis, from the Greek, combines meta, “after” and morphe meaning “form” [Ryan 2011, p. xiv]. As a concept, metamorphosis is found not only in disciplines of zoology, entomology and ecology but within literary and artistic disciplines as well, which reveals its historic cultural complexity. What is evidenced by a study of this concept is nuanced and multi-faceted: as a natural phenomenon it is expressive of evolutionary dynamics; as a cultural concept it emphasises transformation of identity. As a concept for creative practice, it enables the evolving nature of creative production to be underscored and explicitly explored, specifically when concerned with contexts of change.

Through secondary research I found that metaphors abound with butterflies, garnered from their earliest terms of description. The earliest terms for butterflies include their various lifecycle stages and their metaphors; psyche (breath or soul), larva (mask, ghost, hobgoblin), pupa (girl, doll, puppet), chrysalis (gold), and imago (final, most perfect) [Todd 2007, pp. 12-13]. I discovered in this process that the butterfly is a complex subject to study; in artistic terms, it frequently appears as a productive trope or metaphor [MacRae 2007]. In metaphoric terms, butterflies are synonymous with metamorphosis as symbols of change. I continued to think on potentials in this idea of change, to direct a means of change through my practice.

There are many details such as these that I encounter in my study of butterflies. The reason I draw attention to the words and their etymology is to evidence that such details serve to enrich my understanding of butterflies and metamorphosis, situating this study within a broader cultural context and underpinning my depth of analysis in my research for design. As I also use keywords frequently in my creative process, these details assist me to work up my conceptual focus. My butterfly study identified for me the cultural importance and history of butterflies as metaphors. Through analysing and synthesising the variety of sources I consulted, it became evident that butterflies are culturally constructed and mediated through metaphoric analyses, as much as they are real living insects. Therefore, through my secondary research I deepened my understanding of how butterflies function as symbols, how they are used in different artistic contexts for creative inspiration and how such artistic works often involve innovation in the structure and form that works takes, more than just the subject matter. On a personal level, I was able to develop a feeling for the nuances of butterflies and their interpretation, which enabled me to communicate my personal understanding of them through the material and spatial qualities that I work with when designing garments.

The poet, Ovid, best demonstrates the metaphoric power of metamorphosis as a restructuring device. Ovid’s Metamorphoses [Ovid 1986 first published in 1568] is one of the earliest and most well-known artistic works concerning the subject of metamorphosis. In this long poem, Ovid relays the stories of the Greek myths, which he transforms through his method of retelling. Shapeshifting of all kinds of physical beings, including transformations of men, plants, animals, gods, and minerals occurs [Galinsky 1975; Warner 2002]. Although such changes are the subject of the poem’s extended narrative, these are not the only transformations. In his method of telling, Ovid transforms the Greek myths as they were already known [Warner 2002, p. 3]. Ovid does this by integrating the subject matter of the poem with its structure; both are metamorphic. Karl Galinsky [1975] relates that meanings in the work multiply and diversify through maintaining
ambiguity and flux. The way Ovid treats the structure of the poem, his craft, not only represents metamorphosis but ‘metaphorically speaking is (my emphasis) metamorphosis’ [p. 62]. This work, therefore, demonstrates the symbolic potential of metamorphosis as a metaphor for innovation.

I mention the work by Ovid because it acts as a precedent for my use of metamorphosis; it is instructive in the way that metamorphosis at a conceptual level can inspire and influence changes in both the subject and structure of creative works. Hence, when I thought about how I could apply my research for design to direct experimentation, I considered both the structure and subject of my practice, through analogy, using the example of Ovid. I anticipated that it was through an analysis of the structure of my practice, through the relationship between design and pattern cutting, that significant and meaningful changes could be made. The structure of these fundamental relationships in practice defines the values that are associated with them. This reflection assisted me to identify that the conventional structure of my practice made a separation between design and pattern cutting which was critical to re-formulate for experimental practice, as this separation distinguished creative and technical values. This was something that I did not recognise at the outset of this research.

Ovid demonstrates that metamorphosis can be used artistically to create changes in both the subject and structure of works. In my research, I could, therefore, see potential to use butterfly metamorphosis similarly in two different contexts, which represent different layers of enquiry in the Ph.D. First, my study of butterfly metamorphosis is used as a means of exploring new specific lines of design experimentation through pattern cutting. In this way, butterfly metamorphosis forms the subject of design experimentation, and it is directed through metaphoric analysis. At the second level I use butterfly metamorphosis as a way of directing a structural change in my practice over time. These changes affect the resulting relationships of design and pattern cutting, which integrate them much more closely than in my conventional practice. My study of butterfly metamorphosis generates a series of metaphors that operate dynamically throughout this research. It facilitates changes in both the subject of experimentations and the structure of my practice as a whole, as a result of the research.

As I researched more about butterflies I recognised that I also became a lepidopterist as far as any other hobbyist. I sought company in and took further inspiration from artists whose fascination with butterflies supplemented their artistic work. Such artists included the embroiderer and illustrator, Maria Sybilla Merian [Etheridge 2010; Todd 2007] and the writer, Vladimir Nabokov [Blackwell & Johnson 2016]. Merian’s illustrations and close observations of butterflies in their natural environment led to new ways of understanding the butterfly life cycle and underpinned her contribution to science [Etheridge 2010]. Merian’s study was distinct from her peers who collected butterflies as trophies for cabinets of curiosity, plucking them out of their natural environments. Nabokov, although most well known as a writer, was an avid lepidopterist whose highly detailed studies of butterflies, described as Blues, are only recently being reappraised for the quality of their insights, and scientific relevance [Blackwell & Johnson 2016].

### 2.8 Generative metaphors in the project

In this Ph.D. research I make creative use of the differences between the subject of butterfly metamorphosis and my conventional practice of fashion design and pattern cutting. Metaphors enable crossings between two things, which in ordinary understanding are distinctly different to each other. For example, I know that a garment is different to a chrysalis. To make metaphors, however, one needs to act as if these two things are
the same. Hence, when setting out to determine how I could use my study of butterfly metamorphosis to challenge pattern cutting in my practice, I needed first to sense similarities between these two different contexts, to create ways to test and transfer my understanding from one to the other. In such a way, I activated metaphoric analysis by imagining that my garment was a chrysalis. Based on my observations of chrysalides in *Becoming-a-lepidopterist* and the qualities I discovered about butterfly metamorphosis in my secondary research, I started to explore these notions when designing and making my garments. I aimed to experiment with pattern cutting in different ways through doing this. I anticipated through this method that I might establish a way to transform pattern cutting in my practice, through evolving insights and developing forward.

When I first decided to study butterfly metamorphosis I did not realise that I already used metaphor in my design process. This was tacit knowledge. I sensed similarities could be drawn upon to explore through practice, I worked more intuitively by using hunches; my understanding of what I was doing was implicit and embedded in my actions. In this research I adapted my study of butterfly metamorphosis for design experimentation using generative metaphors, at first intuitively. Schön [1983] provides illumination on the use of generative metaphors, which he considers can be critical to invention and design [p. 184]. Generative metaphors are acts of ‘metaphor-making’ [p. 185], which are capable of generating ‘new perceptions, explanations and inventions’ [ibid.]. In describing how generative metaphors operate, Schön identifies that there is a process of development. The metaphor is not self-evident from the start, as at first a similarity is noticed or sensed before it can be articulated [p. 186]. A process of reflection is necessary to account for perceptual experiences that are involved with original insights of similarity. Schön describes this as a process of *seeing-as* [p. 138]. For a practitioner to make sense of a situation that is perceived to be unique, an unfamiliar situation is understood as both similar to and different from a familiar one, ‘without first being able to say similar or different with respect to what’ [ibid.]. To direct lines of experimentation through utilising butterfly metamorphosis, I firstly sensed similarities that could be drawn upon for translation to pattern cutting. Using my tacit knowledge of how to translate my research for design, formed through designing collections, I created analogies between my study of butterfly metamorphosis and my pattern cutting practice. Initially, I could not recognise what these similarities were sufficiently well enough to articulate them. However, I started to experiment through my practice. I experienced what is described as ‘an interpretive circle’ [Snodgrass & Coyne 1992, p. 68], where I had to develop my practice while developing my reflection on this same practice. Through refinement and modification of both my pattern cutting practice and my methods of reflection, I developed a more comprehensive understanding of how I used metaphor in my creative process already and how I could expand this strategy for experimental pattern cutting practice.

Metaphor making in the projects evolved through trials and errors and testing divergent lines of exploration. At first I didn’t know if any insights from my study of butterfly metamorphosis could be useful to challenge my conventional practice of pattern cutting, or how. I suspected that I could effect change in my practice by using a method similar to how I previously developed a design concept for a new collection. Starting out, I aimed to evolve several lines of inquiry, to experiment, and then see what happened. This mirrored the ordinary processes I used to initiate designing a new collection of garments, however, this time I aimed to experiment with designing through pattern cutting. This alternative line of thinking reveals a diversification strategy in the translation of the conceptual development from the butterfly metamorphosis study. Rather than find one way to interpret and translate *Becoming-a-lepidopterist*, I initiated several lines of enquiry, as a way to explore the material before focusing down too quickly. Some of these lines of enquiry, however, don’t make complete sense until I was able to reflect more successfully on what they enabled within my practice and how I used them to think through emergent ideas that weren’t completely formed at the beginning. This took time, and development of reflection-as practice.
2.8.1 Metaphor: The garment is a transitioning insect body

In *Becoming-a-lepidopterist*, I had observed many developments in the insect during the period I spent watching. I witnessed some changes that were small and other changes that were dramatic. The small changes I observed were a result of daily growth, while the dramatic changes occurred through the caterpillar molting, and ultimately the metamorphosis. This variation in the scale of changes led me to conceptualise an abstract impression of the insect body as an inherently flexible and dynamic form. When I say conceptualise, I mean this notion was in my mind; when I thought about what I had witnessed, an image of the organism, which continually physically changed formed the most definite impression. This impression of change in the insect I also observed through looking back over my image archive, which I did many times throughout this research process. As an inherently flexible and dynamic form, the form of the insect easily changes or adapts, while these qualities of change are constant. The use of the word transitioning, therefore, aims to convey these conditions of implicit and continuous change, which are not described necessarily by the metamorphosis. The metamorphosis relates to transformation—a complete change from one form to another. Meanwhile, transitioning relates to change that contributes towards transformation; there is a period in which many transitions occur—together they result in the metamorphosis. It was only through close observations that I was able to attune to these developments. These close observations, in turn, enabled me to become more receptive to analysing processes in my pattern cutting practice that had become tacit through repetition.

From my study of butterflies I aimed to explore how I could develop metaphors that would assist me to experiment with my pattern cutting practice. To do this I needed to open out my process, to expand it in new directions. Hence, in conducting this analysis of what I had observed and researched about butterflies and metamorphosis, I was aiming to synthesise and focus this research so that I could use it to direct my experimentation. Therefore, as a result of integrating the variety of research I undertook, I established a metaphor that I could use to experiment with while pattern cutting:

*The garment is a transitioning insect body.*

This metaphor relies on abstract notions of a garment and a transitioning insect body as particular types of forms. Via the idea of form, the garment and the transitioning insect body are explored metaphorically in correspondence with each other. The transitioning insect body is the body of the insect that I observe in *Becoming-a-lepidopterist* to continuously change its form through all stages of the lifecycle—from caterpillar through chrysalis to butterfly emergence. It is always the same organism, yet never the same form. Meanwhile, the garment, in my conventional practice of pattern cutting, I understood tacitly as a static notion, a single outcome that is produced as a result at the end of the pattern cutting and making process. This metaphor, therefore, facilitates an exploratory relationship between notions of static and dynamic form in my pattern cutting practice. It assists me to draw attention towards the processes I use to create patterns, rather than the results. This increased awareness of process ultimately leads to the generation of a new metaphor that a garment is a dynamic form, underpinning the development of *spatial creativity* in pattern cutting, which I detail in the next chapter.

During my research of butterfly metamorphosis, I came across discussions of a notion of form that was very different to what I was accustomed to through flat pattern cutting. This notion of form is theorised by D’Arcy Wentworth Thompson [1917], in *On growth and form*, first published in 1917. A mathematician and natural scientist, Thompson [1917] sought to account for why similar physical structures appear regularly in nature in both organic and inorganic forms. For example, a spiral might occur in the
growth of a seashell, while also in a wind formation [see for example, Ball 2009; Stevens 1974]. Thompson came up with a theory based on shapes, patterns and self-organising principles, resulting in a holistic account of natural forms as a result of physical forces, rather than as a collection of smaller parts [Rose 2017]. In Thompson’s view, the process of bringing the form into being is constitutive of his notion of form itself. Rather than identify form as a static notion, such as what my drawing and translation through the pattern signifies, Thompson posits form as a dynamic and emergent process.

I started to consider how this notion of dynamic form might enable me to reflect more closely on my tacit understanding of form in my pattern cutting practice. In my existing pattern cutting practice, the form of the garment was delineated precisely through its drawing. Once drawn, the garment assumed an identifiable structure with design elements that could be analysed and broken down into separate component pieces and shapes. In my conventional practice of pattern cutting, each garment I made a pattern for was, therefore, a singular and static form. What I mean by static is that each garment has one expression of form in the design process that does not change. Because my garments were close-fitting, the stability of their forms was also apparent when they were worn or placed on hangers. I was accustomed to thinking about the form of the garment as something that was pre-determined in such a way through drawing, through regular pattern cutting practice. And hence, the pattern cutting process was used to iterate this static, yet tacit, notion of form in my fashion design practice. Once this form was translated through to the pattern, it was applied as a template to cut the fabric. Hence, the pattern performs its prescribed function as a unit that enables the multiplication of copies, in the context of industrial garment production. The notion of static form is, therefore, more pervasive; it structures the way that manufacturing of garments occurs, using a pattern as a template.

2.8.2 Metaphor: the garment is a dynamic form

A collection of architects and designers revisit Thompson’s [1917] notions of growth and form from perspectives of form in design [Beesley & Bonnemaison 2008]. Textile designer, Ann Richards [2008], discusses the dynamic notion of form concerning her practice of making weavings. For her, the material qualities of the weaving process, are intricately connected to the development of the resulting form of the textile. Richards relates:

If living organisms are “diagrams of forces,” so too then are artefacts—their finished form reveals the presence of existing forces but also bears the traces of the process that brought them into being [p. 116].

Richards elaborates further that Thompson’s notion of form relies on a dynamic understanding of growth that is about more than just a change in size; form is the result of forces—events that happen in time and space, not just a configuration in space [p. 115]. This conception of form as relating to both time and space means that the creation of form involves both a process and its resulting physical attributes. Form is, therefore, time bound and unfolds transitionally. Hence, when I started to explore the notion of form to facilitate the transfer of my metaphoric strategy to pattern cutting, it was through exploring this alternative notion of form as dynamic. This notion of form enabled me to start to focus on the process of pattern cutting and how I could intervene to challenge habits of practice.

2.8.3 Metaphor: The garment is a chrysalis formation

In Becoming-a-Lepidopterist I had observed the chrysalis formation closely and revisited my recordings of this event many times to reflect on the dynamic nature of the insect formation. What was it about this chrysalis formation that was so intriguing to me that I
thought I could apply what I found to my pattern cutting practice? Why had I chosen to focus on this as a means to challenge habits of practice? What could I achieve through doing this that I could not otherwise? Something in the closeness of my observations and my returning every day to watch these tiny creatures formed a strong impression. I had shared in the lives of these creatures in a very personal and intimate way. In the chrysalis formation I had witnessed the dramatic change through which the insect first pupates, changing from the complex form of the caterpillar with separate body parts, legs and all, to become a more ambiguous blob. In Becoming-a-lepidopterist I had closely attuned to the times when I could witness this profound change in form. I had watched and waited for the moments when this profound transformation would begin to happen. I revisited the chrysalis formation many times through analysing my stills photography, to break it down and better visualise the complexity of the transformative event. Through these methods I retained a strong impression of the chrysalis formation. In this formation, the pupa emerges from the inside of the caterpillar. The caterpillar skin splits and sheds, the pupa wriggles and swirls. The shape of the pupa is ambiguous, its volume moves variously up and down, and around, before it finally finds its chrysalis shape, becomes still, and hardens. It was clear that the spatial attributes of the chrysalis and its emergence were guiding my fascination with this event.

I realised that my observations of the chrysalis formation represent a process that not many are able to witness unless it is studied closely. By analogy, this reflection can be turned towards my practice through observations of my own activities. As a designer I am inspired to learn and evolve through what I do not yet know. This is because I find opportunities in such experiences for activating imaginative thinking and for changing my thinking and my actions as a designer. Ingold [2013] states that ‘to know things you have to grow into them, and let them grow in you, so that they become a part of who you are’ [p. 1].

Figure 2.16 Common Eggfly, chrysalis formation.
Based on my study of the chrysalis formation, I develop a metaphor for testing through pattern cutting, which focuses on this dynamic nature of the chrysalis formation.

The garment is a chrysalis formation.

This metaphor continues to rely on abstract notions of a garment and a chrysalis formation, via the idea of form. However, in focusing on the chrysalis formation, I attuned more closely to the nature of change that is evidenced through forming materials. This was because in the chrysalis formation, the change occurs from within the organism; it was evident in the very stuff of the body that is changing. The change happens from the inside out.

2.9 Chapter 2 concluding remarks

Becoming-a-lepidopterist represents a departure, break, or interval, which, through becoming a grower of butterflies, allowed me to develop methods of careful and quiet observation. At first, I did not know how to effect change in my practice of design and pattern cutting. I was too inside the process to be able to see it clearly. Through developing these observational strategies, however, I later was able to bring a more critical reflective lens to my behaviours and actions in practice and work towards surfacing tacit knowledge. As such, this study, 

Becoming-a-lepidopterist functions to give presence to the intimate experience with insects, enabling a shift in perspective through this close encounter.

When Becoming-a-lepidopterist I engaged in a hands-on way with the material nature of butterfly metamorphosis. This involved my metaphorical handling of the concept of metamorphosis, through close proximity and daily interactions with insects, in a similar way to which I handled the familiar materials and tools I used when designing. I used Becoming-a-lepidopterist as an imaginary title. It assisted me to identify how growing butterflies became part of my practice, as research for design. I recognized, when Becoming-a-lepidopterist that I grew butterflies through the perspective of a fashion designer. The depth of this study allowed me to expand it for integration through metaphorical analysis in multi-layered ways, and underpins my design enquiry in the Ph.D. project which stretched many years. As such, this is more than inspiration for a project. This research for design is used to redirect my practice, and re-structure the relationship of design and pattern cutting within it.

The study, Becoming-a-lepidopterist, forms the body of research that was used metaphorically to direct design experiments in the projects. Metaphors are used to direct and focus experimentation in pattern cutting, with specific reference to the notion of garment form in my pattern cutting practice. The use of metaphor, expanded from my ordinary design process, through my research process, becomes a critical enabler of reflection—on and—through practice. Through using metaphors I start to make comparisons that assist me to understand more critically what it is that I do in my ordinary practice and how my tacit understanding can be directed in alternative ways. As a process of seeing-as [Schön 1983, p. 185], the metaphoric process enabled a shift in my practice through the reflection that was developed using this method. As I started to see my garments differently through the use of metaphor, I was able to identify more qualities that defined my conventional practice, particularly the separation between design and pattern cutting and how I could re-structure this severed relationship. My metaphoric method enables me, therefore, to begin to surface my tacit knowing, by forming distance through seeing-as [ibid.]. I initiated the next projects, Flatness Garments and Transitioning Garments, with the intention to challenge my habitual practice of flat pattern cutting by developing the use of metaphors created through my study, Becoming-a-lepidopterist.
Chapter 3

SPATIAL CREATIVITY IN EXPERIMENTAL CUTTING
3.1 *Spatial creativity* in pattern cutting

*Spatial creativity* in my pattern cutting practice was encountered when I started to challenge the notion of static form in my practice. As discussed, the notion of static form came about through my reliance on pre-determined, static representation of bodies—the mannequin, figure templates and block patterns. There are two types of pattern cutting that are encountered most often, mass-production and tailoring, which form a bias of Western pattern cutting [Sissons 2014, p. 262]. Both are ‘primarily concerned with the fit translation and replication of a pre-designed garment’ [ibid.]. It is through the practice of flat pattern cutting that the pre-designed garment, through being drawn, is translated through the use of conventional principles, and conventional representations of bodies. Dominant methods of pattern cutting do not accommodate for cutting practices that incorporate modelling using alternative sources other than the body and which might express values contrary to notions of ‘fit.’ Alternative cutting practices require more articulation using examples of how they are developed and applied in practice.

The most common types of pattern cutting underpin familiar perceptions and tacit understanding of the notion of form in fashion design and its relationship to the body. Garment types and silhouette are the most common ways that form in fashion is described [Landahl 2015, p. 13], and the pervasiveness of garment types can be a problem when trying to design new or unknown shapes [p. 29]. In flat pattern cutting the use of garment types is omnipresent; they are commonly represented as garment blocks, upon which the principles of flat pattern cutting are founded. In my conventional practice of fashion design I frequently planned my collection designs using garment styles to plan my range. For example, I knew how many pants and dresses I needed to design in advance. This practice pre-codes the understanding of the types of forms that fashion designers work with, and it can be difficult to develop alternative thinking about form as such garment styles are dominant in representations of fashion. An underlying concern with this notion of garment form in fashion design is a central theme across my account of both projects within this chapter.

In the projects contained within this chapter I developed reflection on the use of form in my practice of pattern cutting. Through using metaphors adapted from *Becoming-a-lepidopterist*, I explored alternative notions of form and how they could be adapted by applying analogy to my pattern cutting practice. This strategy enabled me to shift my tacit understanding of qualities of pattern cutting to a more explicit account, which revealed opportunities to explore pattern cutting in alternative ways. Focusing on the notion of form allowed me to transfer understanding from my observations of butterfly metamorphosis, as I had observed very closely how the body of the insect was constantly transitioning, as a dynamic form. Through analogies, I therefore started to reflect much more closely on how my habitual understanding of garment forms was connected to the practice of flat pattern cutting. I started to design more abstractly with the garments, as spatial forms, to challenge my reliance on garment styles when designing, and to explore spatial variables more directly in my practice.
3.2 Project 1: Flatness Garments

Journal entry, 5 November 2014.

A crack
metamorphosis opens a new space of possibility within the work itself.

The experimental pattern cutting in Flatness Garments was directed through adapting the metaphor of the garment as a transitioning insect body. When creating the garments of this project I explored how to use this metaphor to reflect on my conventional practice of flat pattern cutting, while experimenting with an alternative method of pattern creation.

In the Flatness Garments project I experimented with making garments that are described through a distinctive quality of their forms—that of flatness. In this project I created two related series of patterns, toiles and garments, titled Flatness Series I and Flatness Series II. I decided to explore flatness garment cutting as I recognised a difference in how the form of the garment was produced using this technique. This enabled me to consider if a change in pattern cutting, using this method, might prove instructive or insightful.

My investigation into flatness garment cutting began with the exploration of some examples from Miranda Tsui’s [2008] book Flatness Folded. The flatness garments in this book are garments that are completely flat or 2D when they are laid on a surface. This sometimes means that they have seams dividing the front and back of the garment, which enables the seam to facilitate the effect of flatness. Alternatively, it means that the garments can be placed otherwise on a surface so that no volume or shaping disturbs the flatness of the garment surface when laid out. Tsui’s flatness garments do not incorporate 3D shaping techniques such as darts, or dart equivalence such as gathering, which might disturb the quality of flatness. The overall effect of the garment when it is laid flat is to portray a planar surface. Flatness, therefore, describes a particular spatial quality of the garments.

When initiating the experiments with the flatness method, the use of the metaphor of the transitioning insect body shifted my focus towards exploring the spatial qualities of the garment as a dynamic form. This enabled reflection on the static notion of form defined through the use of mannequins, figure templates and pre-made pattern blocks, which directed garment design in my conventional practice. While the use of this metaphor facilitated a new direction for thinking about how to design the spatial qualities of the forms of garments in my practice, the experiments with processes of pattern cutting are the means through which I reflected on my practice as it transitioned through an interrogation of my habits of pattern cutting.

3.2.1 Flatness Series I

From my perspective as a designer who makes patterns, within the flatness garments I explored as research examples, there exists a visual and spatial intrigue or ambiguity in the garment. Tsui [2008] refers to this as ‘intriguing shapes’ [p.10]. This spatial ambiguity is apparent when I look at the 2D form of the garment and imagine its 3D form. The 2D form is the garment when it is laid on a flat surface. The 3D form is the garment when it is embodied, that is, when it is worn on a body or dresses some kind of form. As a pattern cutter, when I look at the 2D forms of the garments, I am prompted to imagine how they will look when worn and how they will interact with the body through movement. However, I am not easily able to make this transition to 3D in my mind. There is a spatial ambiguity present due to the abstraction in the shapes of the garments, compared to the more familiar shape of the body. I anticipated that this quality of ambiguity might prove insightful in my aim to challenge my conventional flat pattern cutting methods, which relied on designing with a static notion of form, developed through practice with pattern blocks.

While flat garments have been included in other contexts, such as zero waste [Rissanen & McQuillan 2016, pp. 12-24], there have been minimal studies of these garments from
the perspective of this spatial ambiguity. This ambiguity arises in the transition between
the 2D to the 3D form of the garment. This spatial transition is involved with the pattern
creation and materialisation of the actual garment. It was through noticing this ambiguity
that I related the metaphor of the garment as a transitioning insect body. The flatness
garments appear to transition their forms, through analogy.

It was this ambiguity in the shift between the 2D and 3D forms of the garment that I
aimed to explore through design experimentation in Flatness Garments. This uncertainty
lent a distinctly different quality to these garments compared with those I conventionally
made, which kept the same shape no matter if they were hanging, worn or placed on a
flat surface. The contemporary Chinese designer, Zhang Da explains this difference in
the following way:

In Europe you can use the draping technique to make the form—you shape
it perfectly the way you want it—even when you take it off to hang it on the
rack, the shape is still there. But for my clothes, if you take it off from the
body, it becomes flat [Teunissen & Brand 2014, p. 30].

Each of the garments in Tsui’s [2008] book includes a pattern construction and
measurements. For Flatness Series I, I selected five garments to trial. I began by replicating
each garment construction, using the measurements provided as a guide, however, scaling
each up by at least another third. Following this, I created a set of garment patterns, made
toiles, and assessed these on a model. I made any alterations necessary to accommodate
how the garments looked proportionally on the body and how the garments interacted with
the model’s movement. Following any adjustments, I remade the toiles and refit.

In Flatness Series I, I failed to notice at the time I drafted the patterns, however, that the book
includes removable patterns inserted into the jacket flaps. Instead, my method involved
analysing the pattern constructions into component shapes, for example, as collections of

Figure 3.1 Five flatness garments I selected to experiment with from Flatness Folded [2008].
Permission granted to reproduce these images by Miranda Tsui and MCCM Creations.
squares, rectangles and triangles, and creating the pattern drafts in this manner. I also assessed the pattern constructions for balance and proportion in the relationship of specific shapes to the whole, as I drafted the pattern. My method means that there is individual variation in my pattern reconstructions, based on my analysis. It also indicates that there is more than one way to recreate the patterns. My eagerness to work directly with the intriguing shapes of the garments and their constructions revealed my comfort with making my way through a pattern construction, using the knowledge I already have of pattern cutting. This pre-existing knowledge involves the ability to break shapes down using seam divisions into a range of structural components.

I realised that this oversight in my method, rather than being a mistake, revealed an opportunity for reflecting on my pattern cutting approach. It allowed me to explore the re-creation of these patterns individually and to use my tacit understanding of dividing forms into component pieces to interpret the way to do this. In this process, I noticed how I created the pattern shapes for flatness garments through combinations
of individual geometric shape components. This method of shape creation in pattern cutting drew on my tacit knowledge of analysing spatial variables in a pattern into relief. The experiments with flatness revealed alternative ways of making patterns, by using collections of geometric shapes in a hands-on, ad hoc way.

The experience derived from fitting and altering the Flatness Series I garments during this process was different to how I would usually fit a garment. I didn’t have a preconceived idea of exactly how each garment should fit because the space between the garment and the body was differently shaped and sized to that within the garments produced through flat pattern cutting. In my conventional practice I relied on using pattern blocks that were contoured to the measurements of a standard sized body. When fitting the flatness garments, however, I made adjustments by relying upon my tacit understanding of balance and proportion, combined with the reaction of the garment to the movement of the body, assessed during fittings with a model. It was through this fitting analysis that I became more attuned to the ambiguity between 2D and 3D forms of these garments. During fittings I made critical assessments of how interaction between the body, and the volume created by the shapes of the flatness garments accentuated this ambiguity. There was much more fluidity and movement between the body and the garment than within my garment outcomes that resulted from a conventional approach using flat pattern cutting. In my conventional practice, while I relied on ongoing assessments for garment fit during model fittings on a live body to check on qualities such as movement and ease, I overlooked the internal volume of the garment otherwise. I suspected that the internal volume of the garment could be explored to enhance spatial creativity.

Figure 3.4 Drawing to convey the spatial ambiguity in the garment.
3.2.2 Flatness Series II

In the next series of garments, Flatness Series II, I aimed to explore the ambiguity between the 2D and 3D representations of the flatness garments further. To enhance the 2D design possibilities, I evolved the Flatness Garments project by exploring the relationship between pattern cutting and textile print. In my existing fashion design practice, I always designed my textile prints for each collection. For Flatness Series II, I worked with a textile designer, Armando Chant. This collaboration enabled me to explore the relationship between garment and print design in a different way and to focus on pattern cutting more explicitly. In the past, I mostly designed textile prints with small repeat motifs, which did not require special consideration of print placement on the garment for pattern cutting. By contrast, in this collaboration, the artwork was abstract and large scale with placement prints ranging from 1m to 2.5m, and hence, a very different approach to integrating the print through placement design and cutting was required.

I made seven new garments in the Flatness Series II project. In the design of each of these garments, pattern cutting required a different type of attention and consideration to be given to the visual qualities of the artwork and the 2D design of the garment. The print integration for the garment planning was determined in advance by estimating the meterage required for each garment, which defined the scale of the artwork for each piece of cloth before being sent for print production. Considering the synergy between the pattern shape and size together with the artwork became critical in determining the design of the resulting 2D surface of the garment. Both the size and shape of the patterns needed to allow for expression of the scale, shapes and details within the artworks.

I returned to thinking about the garment as a transitioning insect body and wondered further how I could enhance the metaphoric relationship between the garment and the insect to shift my pattern cutting practice. Using some of the Flatness Series I garments, I aimed to explore how I could further integrate the notion of transitioning in these garments, using the quality of flatness. Hence I intended to enhance the qualities of transition in the planar surface of the garments, through my methods of cutting. To experiment with intensifying the transitional qualities of the garments, I combined some of the rectilinear and triangular shapes of the Flatness Series I garments with some of the more abstract and curved shapes from my butterfly drawings. I used collage as a method to explore making visual juxtapositions between the Flatness Series I garments and my drawings, to produce altered planar arrangements. Through this process of cut and paste, I experimented with paper collage methods in a hands-on way. This cut and paste process created synergy between my drawing and pattern cutting methods.

Journal entry, 9 October 2014.

It's the breaking up of the whole in order that the new can emerge.

I had observed shedding in the insect body during my observations. This shedding occurred many times, in the caterpillar molting, during the pupation and the emergence of the butterfly. In each shedding a splitting of the skin of the insect happened, through which a new insect body emerged. Through sensing parallels between this shedding and my pattern cutting practice, I thought about this splitting as a cut. Cutting is defined as a division, a fracture, a separation, or a break. However, through witnessing this type of splitting as a type of cutting, I became more aware that cutting could also facilitate the emergence of the new. This splitting of the insect enabled it to emerge with a new form. Thinking about this insight in relation to my pattern cutting practice, I reflected that cuts defined through the pattern make more complete sense when these same cuts are joined back together through seaming. A subtle shift in perspective enabled me to wonder further how I could use this quality of cutting formed through rejoining, to underpin the development of my garment designs.

I explored the flat garment cutting methods further by combining and cutting up my drawings, merging and rearranging them into new pattern constructions. Through this physical process of cutting and pasting, I trialled new visual combinations and
variations quickly. Multiple options were arranged on the page before I decided on abstract shape formations and stuck them down. The resulting collages created new planar shapes for flatness garments which then became my construction plans for pattern cutting. I evolved the flatness garment cutting method further by incorporating shaped fabric inserts into some seams, which added additional flat layers to some garments. *Spatial creativity* was enhanced through cutting and construction using planar qualities to evolve the design.

Collage is understood to be a direct manifestation of a ‘cut and paste process’ [Boden 2004, p. 130, cited in Prager 2012, p. 266] that enables the development of new structures. Described as a combinatorial process, the use of collage creates a new unity from disparate inputs [ibid.]. Combinatorial processes are one of the three ways creativity is understood to occur—by ‘making unfamiliar combinations of familiar ideas’ [Boden 2004, p. 3]. This understanding of creativity emphasises the use of existing experiences in new ways, asserting that creativity, therefore, emerges from something rather than from nothing [p. 11].

The collage process, when used in pattern cutting, enabled exploratory crossings between methods of flat garment cutting and butterfly drawing, manifested in a literal, physical way through the embodied process of handling the collaged parts. This process evidences an evolution in the flatness garment cutting method, a step that both followed and added to the prior experimentations. It enabled me to rearrange the garment shapes without relying on the use of garment blocks. What this experimentation surfaces is deeper, exploratory thinking between fashion design and butterfly metamorphosis, which underpins my developing experimentation with metaphor. I was still exploring the metaphor of the garment as transitioning insect body and this was manifesting more literally through this cut and paste process of collage, through which I combined my record of my observations with butterflies with my pattern cutting techniques.

In this experimentation, I realised that cutting and combining shapes using paper is a process that can develop new pattern outcomes. Through the direct manipulation of the manual paper processes required for collage, I simultaneously produced new planar combinations which in turn defined new pattern constructions for garment shapes. Through this realisation, I started to reconsider the activities of cutting and then of pasting and rearranging pieces as a design method that can be used to explore pattern cutting differently, by using the 2D process of manipulating shapes on paper, in alternative ways. This realisation enabled me to reflect on the skills I already had through cutting.
paper patterns and how I could alternatively expand these skills through collage to develop paper patterns. This method demonstrates that collage is a strategy that pattern cutters can use in practice to develop spatial creativity using planar surfaces.

The collages created in this exploratory phase were used to plan new garment designs for Flatness Series II. Through collaging, I determined the planar shape of the flatness garment as a graphic silhouette, while planning divisions using smaller pieces, which through cutting, inserting, and rejoining, became seams. Reflecting on this technique further, I realised that it parallels the same method I used already in my practice to translate a garment drawing into a pattern. I replaced a drawing of a garment with a collage of a garment. The collages were used to plot the garment pattern draft construction and then to trace individual pattern pieces for the pattern set. In this process, however, a shift occurred in the spatial design of the garment. Instead of starting the pattern cutting process with a drawing of a garment using a figure template to represent the human body or using pattern blocks, the plan for the garment emerges through the collage method. Using collage enabled the pattern to be made from a more ambiguous mix of shapes on the page, with properties of flatness. This quality of flatness draws emphasis to the visual nature of the pattern itself and how it can be manipulated using various methods with paper. I had previously overlooked this quality of the pattern as an enabler for spatial creativity in garment design.

To enhance the transitional notion of each flatness garment through cutting, I designed a mix of strategies for print placement. Some of the Flatness Series II garments were planned with minimal seam divisions to showcase the full artworks as much as possible. My intention for these garments was to express visual continuity using their surface design and placement through cutting. Other Flatness Series II garments were explored to emphasise the creation of visual discontinuity across seams. Visual juxtapositions are created when garment pattern cutting is explored as a method of cutting and
recombination through seam joining. Such juxtapositions emphasise movement across the surface of the Flatness Series II garments made possible through cutting and recombining the artworks, using seams. In this manner, I enhanced my usage of the 2D quality of the Flatness Series II garments by using cutting and seaming to create movement across the surface of the garment.

In some of the Flatness Series II garments, I aimed to make visual juxtapositions more evident by combining different artworks and mixing fabric types within the same garment. As a result, the collection of garments produced evidence variety in the way the artworks are placed and cut, with a mix of displacement and continuity across the resulting surface design of each garment. Although I had preplanned the scale and number of prints per fabric type, the abstract nature of each artwork meant that the exact placement of each pattern piece was determined piece by piece in the process of cutting the fabric. Each garment, therefore, reflects a nuanced physical interaction between cutting and visual arrangement, which required my aesthetic judgment. In combination with enhancing the transitional qualities of 2D to 3D, these garments aimed to express the conditions of movement that are evident in the transitioning insect body as a dynamic form. These qualities of movement are produced by closely attuning to the visual surface of the fabric and how it can be cut and recombined in new ways through seam joining. Therefore, another strategy for creativity in cutting was revealed through working with printed cloth and cutting it piece by piece. Visual juxtapositions in the overall aesthetic of each garment convey this effect of movement resulting from decisions made during the cutting process.
Figure 3.9  Flatness Series II (part 1), 2D and 3D forms of the garment showing print continuity and juxtapositions across seams.

Figure 3.10  Flatness Series II (part 2), 2D and 3D forms of the garment showing print continuity and juxtapositions across seams.
3.3 Flatness precedents in fashion design

In my research I found it useful to distinguish between flat garments and flatness garments. Flat garments frequently appear in traditional dress [see Burnham 1973 for example] in a variety of cultures. Tsui’s [2008] collection of 23 styles, however, evidences contemporary interpretation of flat garment cutting by Chinese designers, which feature the quality of flatness. There is a subtle yet important difference between flat garments and flatness garments due to the incorporation of 3D shaping details in some flat garments. Moreover, the shapes of the pieces in flat garments were often based on the development of local traditions and loom widths [Burnham 1973], which aimed to maximise the usage of the complete piece of cloth. Traditional flat garments and garments derived from them can include 3D shaping, for example, dart equivalence and gussets. These details, when included in the garment, can disturb the quality of flatness. I draw attention to this difference because the quality of flatness was what I was interested in exploring, rather than to investigate the traditional cuts or details that are associated with flat garments as a broader category. Through the quality of flatness I identified a spatial focus in the garments for my experiments. I did not, therefore, intend historical or comparative analyses of flat garment styles and their patterns. Tsui’s examples evidence this quality of flatness in the 2D representations of the garments.

McKinney et al. [2016] undertook research focusing on tacit knowledge in the Pattern Magic [Nakamichi 2010, 2011, 2012] series of pattern cutting texts and included flatness described as a pattern cutting principle. In their research, a series of new principles that included flatness aimed to account for some pattern cutting principles present in the Nakamichi texts, which are not accounted for in more traditional methods of flat pattern cutting (the example given is Helen Joseph-Armstrong [2010]) [McKinney et al. 2016]. McKinney et al. describe flatness as a pattern cutting principle in the following way—‘geometric shapes become 3D with the body inserted’ [p. 136]. It is evident from my research that more analysis can be undertaken of flatness garments and that they should be considered a more expansive category of garments. I found that flatness extends beyond the use of geometric shapes or their additions to standard blocks. This is because planar shapes can be constructed in more abstract and complex ways than geometric shapes, which, by definition are mathematically defined and regular. Expanding the practice of form creation for fashion design involves investigating many different kinds of planar shapes and 2D expressions as garment patterns. I agree with the authors conclusion—that the study of flatness patterns is important for challenging the traditional relationship of the body to the garment [p. 137]. However, my research evidences that more experimentation with alternative 2D shape making practices expands flatness garments for further analysis through practice.

The quality of flatness such as I have described, is incorporated in garments by other fashion designers. While there are many existing examples, I will limit my discussion to Issey Miyake [Miyake 2001, 2012; Miyake & Reality Lab 2016], Hiroaki Ohya [Ohya 1999] and ANREALAGE [ANREALAGE 2013]. Sometimes flatness is related to traditional garments, such as the kimono, which are defined by particular conventions of cutting. For example, in some garments by Miyake a relationship to traditional Japanese workwear and the kimono underpins the form of some garments. Other times flatness relates to how a single piece of cloth is used, as a flat plane. Miyake [2001] has explored the idea of a piece of cloth and the connection to flat clothing methodologies since the early 1970s. Miyake’s interest in the kimono is shown to be part of his interest in traditional practices and the ‘piece of cloth’ concept forms part of a broader philosophy of ‘a universal clothing’ [Fukai 2010b; Hiramitsu 2005; Koike 2016]. Flatness garments frequently include other variables including oversize, loose-fitting and unisex features, which aids in expanding the notion of what types of bodies they are made for and are designed to fit, underpinning the versatility in the forms of such garments.
In flatness garments, the internal volume of the garment can become activated in more ambiguous ways through being worn. The ambiguity in the shifting internal space between the body and cloth in flatness garments has often been described by reference to the Japanese kimono. When it is not worn, the kimono is flat [Fukai 2010b, p. 16]. However, when worn, the kimono comes into contact with the body only in some locations, opening up a sense of shifting space between the cloth and the body [English 2011; Hiramitsu 2005]. This shifting space is described in Japanese by the aesthetic quality *ma*, understood not as a void, but 'a rich space that possesses incalculable energy' [Fukai 2010b, p. 16]. There is minimal analysis of experimental methods through which this ambiguous space can become actively explored using design and pattern cutting.

In some cases of Miyake, flatness is used as an ambiguous spatial quality that becomes differently activated in the garment form. This ambiguous quality of flatness is an employed property in *Pleats Please* [Miyake 2012], *A Piece of Cloth* [Miyake 2001] and *132.5* [Miyake & Reality Lab 2016], which emphasize the spatial qualities of flatness in many representations of the individual garments. This quality underpins how they function as aesthetic objects as well as garments; they are interesting in their own right due to their planar features. In *Pleats Please* [Miyake 2012], the flatness garment is first produced in an oversized form before being pleated, which reduces its size. The pleats retain the quality of flatness, as there is otherwise no 3D shaping used in these garments. There is a unique relationship between the flatness of the pleated garments and their 3D form, which relies on designing the pattern using flatness (and pleating in this case) [ibid.]. In *A Piece of Cloth* [Miyake 2001], the flatness garments are cut from a tube, with pre-sealed garment edges defining the options for their cut [ibid.]. Meanwhile, in *132.5* [Miyake & Reality Lab 2016], the quality of flatness is expanded with complexity through a mathematically derived origami formula to become 3D through unfolding [ibid.]. Other collections of flatness garments, such as the Alphabet T-Shirts of Hiroki Ohya [Ohya 1999], or the Silhouette S/S 2010 range of ANREALAGE [ANREALAGE 2013], advance qualities of flatness using the novelty of alphabet characters in the case of Ohya, and the shapes of garments in silhouette in the case of ANREALAGE. Flat garments also appear in the work of Anna-Sophie Berger [Berger 2013], Zhang Da of Boundless [Vogue Italia 2011] Isobel Toledo [Steele 2009], Maison Martin Margiela (example collection S/S 1998) [Godsenhoven 2016, p. 99] and Comme des Garçons [Fukai 2010b], as examples.

### 3.4 Flatness and volume inside the garment

What became evident during my experiments with Flatness Garments was that I had to accommodate a much more flexible notion of space between the garment and the body than I was used to. Through reflecting on this quality further, I realised that when designing through drawing and pattern cutting with garment blocks in my conventional practice, the internal volume of garments was treated statically. The interior volume of garments was accepted as an inert quality and not explored further as a design variable. In my conventional practice I minimised the space between the garment surface and the body by removing it through tailoring the garment towards the body or fixing it in position using a garment detail. Both implicated cutting the volume away or making it smaller. When volume was needed inside the garment, it was usually integrated through pleats, tucks, gathers and darting to project garment shapes away from the body. These shapes, however, were anchored through close-fitting garment details, for example, a waistband or yoke. This resulted in a static relationship between the body and the garment, which was defined through pattern cutting.

This was a significant realisation about garment design using pattern cutting, as through it I began to see another way to design garments using the internal volume of the garment more explicitly and flexibly. Rather than shaping the garment towards
the body, I considered how I could extend an imaginary space around the body, which the garment as a perimeter surface could seek to define. The body might then move within the garment with much more flexibility, rather than be contoured by the closeness of cloth. This imaginary space in relation to the body underpins the activation of spatial creativity.

Through reflecting on the outcomes of the two Flatness Garments projects, I derived a better understanding of the perceptible difference in how the garment looks flat, and how the garment looks on the body. From a pattern cutting perspective, this is something that I could only understand after practically trialling this method. While my understanding of flat pattern cutting allowed me to intuit how pattern shapes relate to natural curvature in body shapes, I could not anticipate this relationship in the garment experiments in Flatness Garments. The internal space of flatness garments becomes differently activated when embodied. As the 2D garment surface interacts with the body, the relationship of cloth and the body moves and shifts. The internal space is, therefore, more difficult to define and imagine exactly due to this flexibility. However, this quality is defined by pattern cutting and needs to be thought about carefully during this process.

The straight seams and lack of 3D shaping in the garments meant that the relationship between the body and the garment formed a different spatial language. This new perception of visual and spatial ambiguity in the pattern cutting process led me to reflect further on my conventional practice of pattern cutting. Instead of following the natural shape of the body through contouring, the garment started to float and move more freely. I aimed to explore this quality further to enhance spatial creativity.

Rather than reflect the fitted garment shapes modelled from the body template, pattern blocks or mannequin, I aimed to expand this spatial expression of the garment, by continuing experimentation to activate the volume inside the garment further, using non-conventional pattern cutting methods.

Reflecting later on the process of making these garments, I recognised that opportunities to explore changes in pattern cutting were facilitated. However, habits were also carried forward in the process by my continued aim to make the cutting and construction as efficient as possible. As a result, documentation of the actual pattern cutting and construction process was minimal. I focused instead on photographing the finished garments and patterns as proof of process. While my notebooks include written notes, pattern drafts and drawings, all of which assisted me in completing the design and making process, there is limited expansion of reflective thinking or documentation of the cutting and making process as it occurred. I continued to work quickly.

The conclusion I drew from this exploration of flatness garment cutting, is that a different approach to designing garments is possible through a closer study of these methods. This closer study revealed the expansion of pattern cutting practices using the quality of flatness combined with integration of other practices that rely on manipulating planar surfaces, such as collage. Experimental methods of pattern cutting can be further enhanced through flatness garments by expanding the types of planar shapes and processes that patterns can be made through. Spatial creativity is encountered in the ambiguity between 2D and 3D forms of the garment, which requires using imagination.
3.5 Project 2: Transitioning Garments

In the Transitioning Garments project, I experimented with how to design using the internal space of garments while advancing methods that enhanced variation in pattern creation. The Transitioning Garments project included three series of garments: Transitioning Garments: Series I, Transitioning Garments: Series I Iterations and Transitioning Garments Series II. In each of these series, I explored how to evolve the pattern cutting process to express notions of transition in the form of the garments. In Transitioning Garments I wondered how I could adapt my pattern cutting practice to produce garments that expressed qualities of transition in the way this internal volume can be activated. Therefore, I combined this metaphor of the dynamic, transitioning garment form, with my reflections of the Flatness Garments experiments, regarding the potential to design using the internal volume of the garment.

3.5.1 Transitioning the pattern

The focus on designing using the internal volume of the garment was expanded first through collaborating with spatial designer, Olivier Solente, to exhibit the garments from Flatness Series II. I aimed to exhibit these garments to facilitate reflection on their spatial qualities, specifically the ambiguity between their 2D and 3D forms. I was interested to display the garments in a way that would reflect my process of creating them. This process did not rely on representations of traditional bodies using figure templates or model forms using mannequins. I aimed to display the garments independently of a body, to consider how to emphasise the shift I perceived between the 2D and 3D forms of the garment, in the pattern cutting process. Conventional mannequins were therefore not appropriate.

An experienced practitioner with the conceptual display of garments, Olivier suggested we design our own mannequins by manipulating some of the Flatness Series II patterns. Two new sculptural forms of the patterns were rendered in the 3D modelling software, Rhino. These two new sculptural forms, which we called ‘rock mannequins’ represented new 3D expressions of my two Flatness Series II patterns. These structures were hybrids between garment patterns and sculptural forms. Paper nets were created from each render, which involved flattening the 3D form into a series of component shapes. This paper net was easily combined with my pattern cutting methods to produce a full-scale pattern. This was then cut in corflute, which is a light plastic material with similar thickness to box card.

Figure 3.11 The process of constructing the ‘rock mannequins’ using corflute and fabric.
I then worked to cut the pattern in fabric and adapt my construction techniques to cover each corflute piece with fabric. Each corflute piece was joined with cable ties, which were hidden on the inside of each sculpture. Meanwhile, I sewed together the fabric pieces and made the fabric casing in such a way that the corflute was hidden but used as a rigid support for the fabric. I needed to adapt the fabric cutting as I went to accommodate covering the thickness of the corflute, especially along the vertices.

When I worked collaboratively to create the ‘rock mannequins’, I experienced the merging of my pattern cutting techniques with methods of model making. This new experience involved establishing ways to combine hard and soft materials when creating sculptural forms. This involved making connections between model making, using paper and rigid materials, with pattern cutting the construction of fabric forms. In this way I discovered how the internal volume of the garment could be expressed as a sculptural form, without the use of a conventional mannequin or figure. From this collaborative experience I reflected that the use of sculptural forms could be combined with garment making, to enhance spatial creativity in garment design using hybrid methods of form creation.
3.5.2 Transitioning Garments: Series I

The collaboration for the *Flatness Series II* garments solved the problem of how to display the 3D forms of the garments without using conventional mannequins. The forms became self-supporting as sculptures through the combined use of soft and hard materials. The volume of the garment was therefore expressed in this form very differently than in my conventional practice. In addition, during the process the garment patterns were adapted and created as new digital expressions of form, which were then translated back through my manual pattern cutting methods. This experience further enhanced my understanding of pattern cutting as a spatial practice due to how flexibly my pattern cutting practice using paper and card could integrate with model making to produce hybrid forms. I began to consider how pattern cutting for garments could be expanded in my practice through further explorations with model making. Thinking further on the metaphor of the transitioning insect body, I began to explore the notion of the transitioning garment—that is, through extrapolating the logic of the metaphor; if a garment is a transitioning insect body, then the garment must be transitioning. This involved shifting my thinking about the application of pattern cutting from the conventional process that enables repetition, to a process that enables variations to be made.

This shift in perspective brought a distinctly different notion of the pattern to my awareness. In my conventional practice, once I had developed a pattern and refined it, it was considered complete and therefore represented a stable form. This form could then be repeated by being cut in more than one copy; this form could also be changed in size through grading. However, primarily it was a static representation. Collaborating in the process of creating the ‘rock mannequins’ demonstrated to me that through adaptation of the pattern, variations could result. This quality was already inherent in the methods of flat pattern cutting I conventionally used, however my tacit understanding of the pattern focused on its static, repetitive mode. I therefore, experienced a subtle, yet important shift in perspective regarding how I thought about the pattern as a template for repetition—to think of how, through iteration, variations can be made and a difference is enabled. Through experimenting with the pattern's capacity for variation, it can be adapted and altered, instead of repeated precisely. The garment transitions can be understood by comparing each garment to others in its series.

Using this insight about the variability of the pattern, I aimed to explore how to apply variation in my pattern cutting process further. I intended to experiment with how the ‘rock mannequins’ could become new garments by adapting the patterns again. This involved creating new patterns from the paper nets which were used to make the mannequins and then using them to create new garments.

In *Transitioning Garments: Series I*, I produced two dresses as a result of transforming the paper nets of the ‘rock mannequins’ into new garments. Using the volume of these solids, I considered where to create openings in them so that I could adapt the paper net into wearable outcomes. I established new placements for garment openings. In the pattern cutting process, it became apparent that the sculptural forms of the paper nets could be explored for multiple locations for garment openings and multiple adaptations into garments. As sculptural forms, depending upon how I chose to orient each in relation to the body, variations were possible. These variations were feasible because there was enough internal volume to create a garment design with different orientations, shapes and features. Reflecting on this quality further, I realised that the interior volume of the garment that I noticed in the *Flatness Garments* becomes activated in design differently. Instead of having a pre-conceived front or back orientation, the shell of the form can be turned in different ways, making use of the internal volume to facilitate alternative positions of the form in relation to the body. These alternatives are evident when making decisions about how and where openings for the head, arms and legs can be made. These allow the garment to come into contact with the body using
critical points of gravity, suspending the garment lightly on the body, rather than anchoring it through contoured cutting. Spatial creativity in the pattern cutting process is therefore increased through exploring the volume of the garment for alternative expressions in garment design.

As a result of experimenting with the sculptural form, a shift occurred in thinking about the possibilities of the garment pattern. Rather than design a garment to fit the body, or a contoured volume, the body comes to interact with the garment form independently of a fixed notion of fit. There is, therefore, a more ambiguous relationship between the garment form and the body. Considering how the flattened render can be redesigned into a sculptural outcome also enhances further possibilities for variations in pattern cutting. Edges defined by the paper net can alternatively become seamlines or folds, creating opportunities for internal or external vertices to form around the body. The design of the garment, therefore, is made through a new pattern cutting process, through the method of translating a sculptural form via the use of the paper net into a garment pattern.

The resulting two garments made using the reworked 'rock mannequin' patterns aimed to explore the transitioning use of the pattern in garment creation. These pieces are constructed using remnants from cutting Flatness Series II and applying a technique that emphasised visible seams, further accentuating the concept of transitioning within the garments. They also physically transition by way of the inherent flexibility in their forms, and the different ways they can be represented and worn as a result. These qualities are emphasised through photographing the garment outcomes, wherein the transitional nature of their sculptural forms can be foregrounded.
Figure 3.16 The evolution of the same pattern from Flatness Series II to Transitioning Garments: Series I (this page).

Figure 3.17 Transitioning Garments: Series I, showing flexibility of internal volume (opposite).
3.5.3 Transitioning Garments: Series I Iterations

Journal entry, 1 September 2014.
The cuts enable creative possibilities. Re-make them anew.

In *Transitioning Garments: Series I Iterations* I created two new patterns and garments by aiming to modify one of the *Transitioning Garments: Series I* patterns further through manual manipulation. Using each paper net again, I created iterations of the same pattern by resizing individual pattern pieces in different ways within each pattern set. I directly manipulated the paper net using what I refer to as ‘slash and spread,’ a technique that I was familiar with applying in flat pattern cutting. Helen Joseph-Armstrong [2010] refers to this as ‘slash method’ [p. 70] or ‘slash-spread’ [ibid.] where a cut line is made in a pattern (a slash) which is then used as a hinge to pivot the pattern piece into a new configuration. This method is typically used to transfer the location of a dart [p. 68] or for increasing fullness [p. 132]. I applied the ‘slash and spread’ technique to the small-scale paper net to create new slash lines in the pattern. I pivoted these segments to widen some and overlap others before sticking them into new configurations. I then made a new pattern set by rejoining vertices to create new seam lines, thereby changing many pattern pieces. In the process, I altered the size and dimensions of individual pieces in each pattern while still retaining the same number and arrangement of pieces. I then redrew each pattern piece, scaling each up to full-size in the process. In my ordinary experience with slashing and spreading patterns, careful measurements were required to evenly add or reduce the flare. Using the paper net, however, I slashed and spread without regard for even distribution. I focused instead on how the same pattern could be used to create two new variations in the resulting form of the garments, through repurposing the ‘slash and spread’ method.

The result of each pattern manipulation further evidences how simple alterations can be made to any pattern to produce variations in garment design. In *Transitioning Garments: Series I Iterations*, I explored the idea that a single garment pattern can be used to create modifications in garments, instead of being used as a template to cut multiple units that are the same. Repetition of a single garment pattern is the dominant application of a pattern’s use in the context of mass-production. In flat pattern cutting for mass-production, a pattern is revised through iteration, until it is right—the right fit and the right shape. The notion of iteration, however, can be explored in an alternative way, by attuning more closely to the variation that is possible in the reworking of a pattern, which is involved in the pattern development process. This is an example of difference through repetition, a process that underpins how spatial creativity is enhanced through pattern cutting in this project.

In *Transitioning Garments: Series I Iterations* I used silk-organza in nude colour to create both of these garment experiments. I intended to emphasise the visible construction of seams further by continuing to use this semi-transparent fabric. One garment was eventually hand stitched, as a further exploration of how I could more subtly indicate its difference through surface detailing.

![Figure 3.18 Applying ‘slash and spread’ to the pattern net.](image)

**Figures 3.19 - 3.20** *Transitioning Garments: Series I Iterations, garment 1 (next pages).*
Figure 3.21 Transitioning Garments: Series I Iterations, garment 2 (opposite).

Figure 3.22 Transitioning Garments: Series I Iterations, garment 2 (this page).
3.5.4 Transitioning Garments: Series II

In *Transitioning Garments: Series II*, I aimed to explore the notion of a transitioning garment further, by considering how a garment could embody two formal expressions through its design using sculptural integration. I further aimed to investigate how to design by activating the internal volume of the garment. Using insights from *Transitioning Garments: Series I*, I contemplated how I could design garments that included a removable structural form. In this way, I anticipated that the garment could have two physical expressions that would change depending on whether the added structure was integrated or not. Sometimes I have created garments with internal structure—interlinings, boning and the like, which assist to give a garment a stable shape that is not possible using particular external fabrication alone. Distinct to this type of internal structure that is fixed in place, in this series, I aimed to experiment with pattern creation that could be led by the shape of the added structural form. Therefore, an inversion would be applied that anticipates how the pattern can be designed in response to structural integration, rather than how the structure can support the form of the garment. I aimed to explore methods that made a transition in the garment form to be discernible depending upon if the structure was inserted or not. The inability to anticipate exactly what shapes would be created when the structure was removed, motivated the direction of my pattern cutting experiments. I suspected that I could develop the design potential of the interior volume of each garment, by experimenting with a design process combining structural form and pattern cutting. Through this method I aimed to enhance *spatial creativity* in the garment design, by experimenting with further manipulation of the volume inside the garment.

My idea of a garment with two physical expressions originated while reflecting back on what I had observed and researched during *Becoming-a-lepidopterist*. I was continuing to think of a way to translate the metaphor of the garment as a transitioning insect body and aimed to explore how to relate the most striking, yet ambiguous physical change I had witnessed in the metamorphosis. How can one organism be two forms at once? This is what the chrysalis to me signified. While the chrysalis itself was a strange intermediary blob-like insect form, it was also once a caterpillar and yet to become a butterfly. The chrysalis combined these two potentialities through this more ambiguous form. I was still thinking about how I could use this insight to challenge pattern cutting in my practice. I wondered—how could the one garment have two expressions? How could I enable it to transition, from one form to the other? Would it therefore become dynamic?

Using my insights from adapting the paper nets, I designed the first dress through creating a small paper model, to make a quick 3D impression that I could use to plan the construction of the garment pattern. I used the paper model to plot how I could integrate the structural element within the first dress. To mock-up my idea for its design, I made the paper model as a simple 3D shape, with a bodice garment pattern stuck on the top side. I drew around the edges of one plane in the paper model to indicate where a wooden frame could be inserted, which would act as the structural support. I then worked with the paper model further to problem-solve how I could complete the design of the dress so that a wooden frame could be inserted and also removed.

![Figure 3.23](image)

*Figure 3.23 Making the dress as a paper model to work out construction plan.*
Using this paper model, I sketched out a pattern construction plan to create the first dress. I intended to express two formal variations in the dress; I aimed to design the dress so that it could be hung as a sculptural form and also worn on the body. In these two modes, it would express the transition in forms. However, a problem that remained was how to integrate a large, inflexible, wooden frame with the much softer dress fabric. In working out the construction plan for the pattern creation, I continued to work with the paper model, which facilitated working in the round and making assessments of how I could design using the internal volume. I established that to insert the wooden frame along the top edge as I had marked it on the paper model, a split in the top plane would enable the frame to be inserted.

The split in the top plane allowed me to attach the bodice component as well. On one half I inserted the front bodice, while on the other, the back. The full bodice shape was joined through the shoulder seams. I left the top plane open along the rest of the split, which acts as the side seam position in the dress. The side seam is therefore unattached on both sides, creating openings that allow the rigid wooden frame to be inserted and attached to the inside of each dress. This split in the top plane enabled the bodice to be used in two ways. Firstly, it could be used so that the dress can be worn on a body. Secondly, it could hang in an inverted manner into the volume of the dress. In this way, the bodice and top plane construction, assisted the dress to convey two formal expressions.

Returning to further collaboration with Olivier, four new variations of my pattern were created again using Rhino. The internal volume of my first dress was then manipulated and deformed by Olivier to create four new sculptural variations of this volume. In this way, the volume was iterated, drawing forward the reflection from Transitioning Garments: Series I Iterations. The same process of using the paper nets was then used to create each new garment pattern. In the process of scaling up the paper nets, I developed an improvisational pattern cutting process to create the new garment patterns by hand.

Figure 3.24 Pages from my journal showing my plan for the garment construction.
Firstly, using highlighters, I mapped my intentions for how I would translate each volume into a new garment pattern onto each paper net. For each of the four new volumes, I needed to determine which planes would become the top ones to attach the bodice and which would form the sides of each dress volume. Some of the individual pieces in each paper net were joined together to create larger planes. Every plane that I would make into each new pattern piece was coloured in using highlighters, to better distinguish the separate pieces for pattern cutting. I then enlarged these photocopies so that each pattern plane filled an A3 sheet. I determined measurements for the lengths of each pattern piece edge, which I wrote on each piece. I mapped the total pattern set by numbering each pattern and using a letter for each pattern piece within each set. In this way, I would not get confused when cutting and making up all the patterns. Then, using a new photocopy of these drafts which included my measurements and labelling, I plotted out each new pattern piece by hand onto pattern paper. I decided to make a video of this process, Archi Pattern Creation [Sgro 2014] <http://vimeo.com/donnasgro/archi-pattern-creation>, as it was not my regular pattern cutting process.

Transitioning Garments: Series II includes five new dress patterns. These include my first dress and the following four iterations of the dress volume. I made each dress in lightweight, white cotton voile. The transparent qualities of the fabric best enabled the bodice to be visible in both the dress and the sculptural form. Each of the two versions of the dress looks very different from each other, based on how they were displayed—with the frame or worn on the body. When the dresses are worn on the body, the opening in the top plane facilitates splits to be incorporated along both side seam locations. These openings can remain open or closed, at each side seam waist position. This design facilitates the bodice element to be integrated into both expressions of the dress; when the dress is suspended in its sculptural form using the inserted frame, the bodice reverts to hang visibly inside the interior volume.

Each resulting dress in the Transitioning Garments: Series II project, therefore, has two formal expressions—a sculpture and a garment. When reflecting on this method while within the development process I realized that each garment pattern could be adapted further,
therefore making spatial creativity integral to my design process, through variations of
the technique. Spatial creativity can be increased by considering other garment or dress
expressions and incorporating different types of volumes. For example, if the volume is
reduced in size, it can be attached to become a sleeve. Meanwhile, if the volume in this
method is turned upside-down or sideways, it can further iterate the shape expressions
possible in each dress. Alternative volumes can also be explored for shape expression.
For example, by scaling up the volume of a chair or by using the shape of a piano, these
volumes can also be turned into a garment using this method. There is further potential
therefore to create many more iterations of each of these dresses and to develop
variations of garments using this method.

Throughout this process, I relied on using ad hoc processes to make patterns: rough
draft patterns, paper nets, photocopies, rough cutting, and sticking. It was not important
to get the fitting or measurement processes correct but to find ways to express the
concept of the transitioning garment by altering the pattern in series. These are
experimental methods that are used to open up different ways forward and to tempt
mistakes or chance encounters, which might transition the process in new directions.
Hence the paper pattern cutting processes themselves were experimented with; paper
itself is enhanced as an experimental medium in the pattern cutting process.

Figure 3.27 Each dress had a wooden frame suspended inside.
Figure 3.28  Transitioning Garments: Series II, garment variation 1 as sculptural form (this page).

Figure 3.29  Transitioning Garments: Series II, garment variation 1 as dress (opposite).
Figure 3.30  Transitioning Garments: Series II, garment variation 2 (this page).

Figure 3.31  Transitioning Garments: Series II, garment variation 3 (opposite).
Figure 3.32 Transitioning Garments: Series II, garment variation 4 (opposite).

Figure 3.33 Transitioning Garments: Series II, garment variation 5 (this page).
3.6 Transitional qualities in pattern cutting practice

Through *Transitioning Garments*, I reflect more closely on the spatial variables of pattern cutting and how alternative spatial models can be used as starting points in practice. This opens up a way for the garment form to transition beyond conventional notions of form defined through static body representations, including the mannequin, figure template and block garment styles. There are precedent designer practices that explore these kinds of approaches, however, there is minimal research that is focused on experimenting with pattern cutting as a spatial practice without starting with the body. Therefore, accounts of experimentation using *spatial creativity* remain limited. Form-making practices in conventional pattern cutting are defined through how they both interact with, and measure, the dimensions of the human body. However, it is evident that not all pattern cutting processes need to start with the actual, standardised or idealised body as the locus of practice. Equally, other variables including spatial and material qualities, cutting methods and alternative modelling practices can be starting points. At some point the practice meets the human body, however, this junction can occur at different parts of the process.

The cutting practice of Julian Roberts [2013, 2017] is an exception in this regard. In ‘Subtraction Cutting’ an alternate spatial perspective is explored, which involves designing with tubes and using top-down perspectives, as well as front and back perspectives defined through conventional flat pattern cutting. The preparation of the fabric and the marking out of cuts defines the shape of the garment, before it meets the body. This is not at the expense of the body however, as Roberts’ demonstrations evidence, the body is always present and a collaborator in the design process. The presence of the body is often prefigured in the top sections of garment blocks, which Roberts continues to make use of. However, the process of ‘Subtraction Cutting’ defines a method that ensures a chance encounter with free-forming drape is always part of the process, evidencing spatial variability in each outcome.

The garments by Yoshiki Hishinuma [1986] express an alternative approach to the body that is defined through their pattern cutting process. The patterns of Hishinuma, which are published in *Clothes by Yoshiki Hishinuma* [1986] include some garment patterns as collections of triangles. These patterns serve to demonstrate that in principle, garment patterns can be made through combining geometric shape combinations, rather than derived from the form of the human body. With Hishinuma’s garments, the wind activates a change in dimension, which is facilitated by the pattern design in combination with material choices. Hishinuma’s alternative approach to the body is evident in this description:

Like kimonos, for example, a Hishinuma garment does not depend on an interaction with the body to bring it to life. This stand-alone independence is a primary attribute of Japanese textile and garment design, which often focuses attention away from the body and towards the materials and/or silhouette [Museum at the Fashion Institute of Technology n.d.].

The clothes themselves become performative through being actioned by air and by the wind. The garments are presented in various locations including on the beach, on construction sites, in open fields, in the desert and lush green lakes, flowing down a field of tyres like molten lava, on stage, and on single and multiple bodies. Through interactions with various atmospheric qualities, the garments evidence the variability of their forms. They capture and refract light, float and rest, and are pulled this way or that. Some garments extend to become huge canopies and structures, forming environments within which the body performs, while others become structures that the body can exist inside of.

A project that demonstrates the variability enabled through the spatial practice of pattern cutting is Lucy Orta’s D-FORM project [Orta 2011]. Part of the *Block Party: Contemporary craft inspired by the art of the tailor* [Crafts Council 2011] exhibition, the project included an
A pattern block from Nexus Architecture [Orta 2011, p. 32-33] was provided and users could engage by moving interactive sliders representing different emotional variables. Based on how they were feeling, a user could change the slider, which in turn produced a spatial effect in the garment relating to that emotion. Users could then save their patterns and print their own versions out for experimentation with garment making.

Other examples of pattern cutting practices that achieve variation in pattern creation and underpin distinct approaches to experimenting with garment shape creation, are found through practices that combine model making or sculpting. Such practices reframe approaches to the body in a range of expanded fashion design contexts. Aitor Throup [2017] is known for using 3D models other than conventional mannequins to develop shapes for integration in garments. His first collection, When Football Hooligans Became Hindu Gods, was created in 2006, and his methods have since evolved through his conceptual clothing brand, New Object Research, and collaborations with companies such as C.P. Company and G-Star. His practice involves him drawing and then making 3D models of garments, torsos and sculptural elements (such as elephant heads, skulls, hands and feet) upon which he sculpts his garments [Agerman 2009]. The T-Shirt Issue (now known as HOID) [HOID 2015] was an interdisciplinary collaboration between fashion and industrial designers—Hande Akcayli, Murat Kocyigit, and Rozi Rexhepi—which explored the possibilities of digital pattern construction using CAD/CAM and 3D and animation software [V & A Museum, n.d.]. Known for soft sculpting using jersey fabrics and fusible interfacing, their hybrid garments were digitally modelled before being printed, cut and assembled.

Studies of Japanese designers including Rei Kawakubo, Issey Miyake and Yohji Yamamoto [English 2011, Fukai 2010] often highlight differences regarding approaches to the body in fashion, which are encountered through non-Western pattern cutting approaches. Sometimes these are described as architectural [see for example Hodge 2006]. A range of differences have been attributed to the Japanese culture and aesthetics of these designers, however, a more appropriate term for their difference is defined through the notion of the avant-garde [Kawamura 2004]. As Yuniya Kawamura [2004] has evidenced, Kawakubo, Miyake and Yamamoto pushed against established artistic conventions in both Japanese and Western societies [pp. 125-150]. They aimed to design what was new and individual [ibid.]. However, it is through considering the particular conventions which these designers have challenged, that reflection has been directed towards Western traditions in cutting. For example, “Western dressmaking took the natural shape of the human body as a given” [Fukai 2005, p. 22] while by contrast, Japanese designers approached the body as if to shroud it, concealing shapes that tailoring traditions had conventionally sought to emphasise [ibid.]. There are many examples of differences between Eastern and Western aesthetics and clothing practices that have been used to provide evidence for different approaches toward form creation in fashion design. The study by McKinney et al. [2016] of Nakamichi’s [2010, 2011, 2012] patterns is one such example that relates five aesthetic notions connected to Japanese culture, being: deconstructionism, origami, asymmetry, ‘affinity for nature’ and wabi-sabi [McKinney et al. 2016, p. 133]. However, an extended aesthetic analysis of such principles, which might reveal their complexity has not been made. Instead, they are defined as principles, that simplify such terms for re-appropriation. Experimentation in practice, which is connected to notions of the avant-garde, still remains to be accounted for.

A designer whose practice could be considered avant-garde yet sits further under the radar is the Italian designer, Nanni Strada [2016]. Strada is known for innovating fashion through an approach to cloth and construction. Her innovations included the invention of the seamless suit in collaboration with Italian hosiery company, Calza Bloch [Franceschini 2014]. Strada innovated garment form through textile and seam
development and technology, however, her work was inspired by the flat cutting of Arab-Islamic garments and the ethnographic studies of Max Tilke [Pastore, n.d.]. Max Tilke [1978] was a German ethnographer and artist who conducted in depth studies of traditional costumes. Mappadello [Strada 2012] includes the reproduction of patterns and garment designs from the competition ‘Arab-Islamic National Dress’ in 1974. Strada aimed to develop techniques in which she could free garment design from the conditional nature of anatomy, and her interest in the geometry of flat cutting is connected to this philosophy. She says, 'my aim is to free clothing of its origins in tailoring and its subjugation to the body and to fashions to achieve a compromise between function and poetics, anatomy and geometry, object and symbol' [Strada 2016]. She adds, ‘geometry seems to me to be a great choice of freedom, while the anatomy [sic] conditions you powerfully, that is, it leads you to make choices for an anatomical figure, an ideal body’ [Pastore, n.d.]. Strada focused instead on inventing her own rules and through these critiqued what she saw as the idealisation of the body represented in traditions of tailoring and draping. In this description of her work, I find ideas I can relate to that convey the conditioning of approaches to form in fashion design, formed through conventional pattern cutting practice.

### 3.7. Chapter 3 concluding remarks

While a pattern is conventionally understood as a template that can be scaled for volume production through repetition of multiple cut units, a different application of the notion of a pattern is constructed as a result of these projects. This is the notion of the pattern that can always be altered and is alterable. As such, many of the ‘patterns’ of this research are not considered to be templates; they do not aim for reproduction, but rather to enable the expansion of variation through ongoing experimentation with them. In reflecting on the projects outlined in this chapter, I find that the paper pattern itself is a form of material in my practice; paper and its cutting and pasting enables a method through which experimentation can be conducted with pattern cutting practice.

The metaphor of the garment as a transitioning insect body was beneficial as a strategy to redirect my thinking through pattern cutting. I used this metaphor in both projects Flatness Garments and Transitioning Garments to focus my experimentation and to establish connections between my pattern cutting practice and what I had researched through butterfly metamorphosis. This requires an interdisciplinary mode of thinking, to explore opportunities and find connections that might otherwise be considered too different to reconcile. The use of metaphor enables correlation and correspondence to be formed which link these two different areas of thinking. As my projects developed, these metaphors were revisited and adapted by revising my research for design, and iterating my use of metaphor. This method enhanced my understanding of notions of change and how change can be transitional as well as transformative. In establishing an aim to explore transitional qualities in the garment in these projects, I adapted my butterfly research using metaphor and analogy to establish experimental lines of enquiry through my more conventional flat pattern cutting practice.

What became evident through the Flatness Garments project was how I could activate the internal volume of the garment as a design variable by exploring the quality of flatness in pattern cutting. Testing the flatness method through pattern cutting in Flatness Series I enabled me to reflect on pattern cutting methods I used already and how these could be repurposed. I was able to attune more closely to the transitions between the flatness garments in their 2D and 3D forms using my tacit understanding of balance and proportion as they interacted with the body both spatially and visually. I reflected
that through activating the internal space of the garment as a design variable, changes in pattern cutting could be achieved using qualities of flatness. The ambiguity between the 2D and 3D expression of the garment is a productive enabler for spatial creativity in pattern cutting.

In Flatness Series II, I experimented with collage methods and print integration, as techniques that enhance the visual and spatial planar dimensions of flatness garments. In this process, I reflected on the relationship of the flatness garment and its component pieces, which can be explored for transitional qualities in the surface of the garment through juxtaposition and continuity using seam placement and cutting choices. Designing with flatness garments enabled me to establish alternative ways to begin the pattern cutting process. These alternative starting points challenged my conventional flat pattern cutting practice which relied on starting with static body forms such as the fashion figure template, the mannequin and block patterns. I found that collage as a method of planar arrangement can be adapted to develop pattern constructions, which circumvent the use of static notions of the body.

In the Transitioning Garments project, I established that the garment form could be transitioned using iterations of the pattern. In conventional practice, I relied on thinking that underpinned the repetition of the pattern used as a template. This thinking focuses on getting the pattern correct so that when scaling it through quantity production or through size ranges, it can be cut accurately. However, in Transitioning Garments, I experimented with how the pattern could also be explored for variation. This means, through repeating the usage of the same pattern, that it can express difference through variation. This difference can be noticed when producing these garments in series, rather than as a collection of styles, and varying the same pattern to transition the garment form each time. In Transitioning Garments: Series I, I experimented with making garments using paper nets, which had been previously adapted from my garment patterns. In the process the garment transitions from the first designs, through the sculptural forms, then to the new garments. In Transitioning Garments: Series I Iterations, I used the same paper net from Series I and transitioned this using slash and spread methods, which are more often used with full-scale patterns in flat pattern cutting. In Transitioning Garments: Series II, I explored how to transition the garment form through two expressions using a structural integration that could be removed. In the Transitioning Garments project, each of these techniques represents different ways to enhance spatial creativity using the internal volume of the garment in exploratory ways. The variations expressed in an original garment form starting in Flatness Garments, transitioned to the ‘rock mannequin’, then further through Transitioning Garments: Series I and Transitioning Garments: Series I: Iterations. In the process, the same garment pattern could be used to express difference in each iteration. The variation, which is possible using the same garment pattern, is demonstrated alternatively in Transitioning Garments: Series II by exploring structural integration. In this latter series of garments I varied the garment form based on designing each as two expressions—a garment and a sculpture.

The Flatness Garments and Transitioning Garments projects enabled me to reflect further on the spatial qualities of my garments. This reflection revealed their spatial language as objects, as well as garments, enabling integration with collage and model making practices and emphasizing the experimentation that is afforded through using paper in alternative ways in this process. Through these experiments, I was better able to reflect on my abilities, strengths, and fascinations as a designer for whom pattern cutting is a mode of expression. Through reflecting on the spatial qualities of my garments and my experiments with designing through pattern cutting, I was able to enhance the application of spatial creativity in my pattern cutting practice.

As a result of the explorations with pattern cutting in the projects Flatness Garments and Transitioning Garments, I realised that in my practice I relied very comfortably on handmaking. I began to document my methods more carefully using video in Transitioning...
Garments: Series II and this change assisted me to better reflect on the qualities of my handmaking. I started to see my hands, what they do, and how they measure my thoughts through their changes in pace when I am using them. At this same time, I changed my methods of journaling as well. My journaling practice developed into a method through which I recorded all my reflections and design thinking processes. This development evolved through Flatness Garments to Transitioning Garments. In Flatness Garments I had minimally documented my reflections on my process, using my journal instead to plot my plans that had assisted in the execution of designs. By the end of Transitioning Garments I had redeveloped my journaling so that it more adequately represented my range of thinking and reflective processes. I started to make journal books, comprising photographs, notes, and drawings, which I carried around with me. The combination of these methods enabled a more useful range of reflective practices to be included in my research activities.

Both projects Flatness Garments and Transitioning Garments were undertaken during the formation of a temporary, collaborative practice with Olivier Solente and Armando Chant, called Make.Shift Concepts (2011-2014). Through this practice testing of the boundaries of my practice was made. While a full explication of how collaboration informed the transformation of my practice is outside of the scope of this Ph.D. research, through it, I was able to focus on what defined my own fashion design practice, as a skilled pattern cutter. By collaborating in this way, I realized that what distinguished my technical abilities as a contribution to the collaborative making processes was my abilities as a pattern cutter and maker. This realization enabled me to focus my contribution to design practice through creative pattern cutting. Discussion of the collaborative practice was published [Sgro, Chant & Solente, 2013] and is included in the Appendix (pp. 275-291).

Following from these projects in Chapter 4, I developed my metaphoric strategy at a deeper, more structural level in practice. This development was a result of my change in methods of reflection. I was now able to understand, with a greater degree of clarity,
Chapter 4

MATERIAL CREATIVITY IN EXPERIMENTAL CUTTING
4.1 Material creativity in cutting practice

I introduce the term material creativity to delineate a particular type of creativity which is encountered through experimental pattern cutting using tacit knowledge of materials. As a practitioner, I experience material creativity when designing garments through hands-on experimental engagement with materials. Discovery can occur through experimentation with materials which changes the design outcome in ways that can be unanticipated but yields new outcomes. The development of material creativity requires intentional and practical experimentation with materials when cutting. In the case of my practice, this practical experimentation is carried out using hand-based processes, alongside reflection on and through these processes. Testing materials and methods by hand takes time as iteration is often required [Niedderer & Townsend 2014]. Hence, there is an evolution and development process that is important to account for. Material creativity is formed through intimate physical activities and personal interactions with materials. It emerges through material practice and evolves with experience. Expanding material creativity in experimental pattern cutting involves attuning closely to the personal experience of both working with and analysing what I call material affordances. Material affordances refer to the qualities and principles that are intrinsic to the material being handled. The experience of the practitioner determines how these materials are perceived and can be used. It is through practical experimentation that material affordances can be understood and activated for design outcomes.

Research concerning the creative cutting practice of zero waste fashion design identifies that the ways in which materials are used and appreciated is of critical importance to the future sustainability of the fashion industry [Niinimaki 2013]. Creativity afforded through using materials directly can underpin new experimentations in pattern cutting. The study of experimentation using zero waste fashion design by Kirsi Niinimaki with Holly McQuillan and students at AALTO [ibid.] identified that a closer relationship between fashion and textile design enables creative experimentation in zero waste fashion design by drawing attention to the material [ibid.]. This study showed that if designers can make their own textiles or fabrics, this practice can underpin both the aesthetic development and appreciation of materials by designers. In the case of zero waste fashion design, the closer integration of textile and fashion design underpins a sustainable advantage in such practice. In my research, I have found that through exploring a different relationship of form and material, that creativity is increased when the design of the surface of the garment occurs at the same time as its form. Hence, this practice emphasises synergy between fashion and textile design for mutual creative advantage.

In my training as a designer at the University of Technology Sydney (UTS) (2003-2006), I majored in both fashion and textile design. This combined design approach enables me to understand how to design textiles as well as garments and has informed my practice since this time in different ways. In my teaching practice at UTS (2009-current), I have taught across both fashion and textile design subjects, continuing to build my practice and knowledge in both areas. I have also developed and tested this knowledge in interdisciplinary contexts where I teach methods of 3D forming using paper engineering, which are adapted to create new textile structures, surfaces and garments. In my business practice I applied my textile design knowledge to develop silk screen and digitally printed fabrics for my fashion collections. I have also designed textiles in other ways as a peripheral practice to my collections development. These textiles have included constructed techniques with silk fabrics predominantly, including nuno felting, pleating and piecwork construction. I have exhibited these works in textile exhibitions at the Powerhouse Museum Sydney, Manning Regional Gallery, the Design Institute of Australia Textile Group Exhibitions, and the Tamworth Textile Triennale. In this chapter I acknowledge that the tacit understanding of materials formed through my textile design practice,
critically informs my understanding of materials in my pattern cutting practice. Through drawing these practices together more closely, I can redirect my pattern cutting experimentation through direct material engagement.

In this chapter, I introduce three projects: Chrysalis Shirts, Reconstructed Textiles, and Dynamic Garments. In Chrysalis Shirts I discovered an alternative way to reflect on my practice of pattern cutting, through developing slow hand stitch techniques and focusing on the materials to hand. In Reconstructed Textiles I devoted attention to considering why particular cutting and construction techniques continued to appear in my textile practice, and realised that the knowledge formed through this practice could be adapted for garment cutting. Dynamic Garments was the last project through which I developed a new method for experimental pattern cutting, called Dynamic Cutting. This method synthesized all of the experiments I conducted through this research and drew my fashion design and textile design practices together through a new method of pattern cutting.

4.2 Project 3: Chrysalis Shirts

Journal entry, 5 September 2013.

What is the link between the standard garment blocks and the shifting form?
The form is mutable, the pattern shifts try to find their expression.

In the Chrysalis Shirts project, I experimented with how to alter pattern cutting using a conventional shirt pattern, and the metaphor of the garment as a chrysalis formation. Through the pattern cutting experimentation in this project, I developed a heightened awareness of my tacit understanding of the material affordances I worked with. This specifically occurred when I reflected that the pattern cutting experiments fell short of my aim to convey the metaphor of the garment as chrysalis formation. As a result, a new practice of hand stitching emerges through this project in response to reflecting on working with the fabric, rather than the paper pattern. The Chrysalis Shirts project is an example of practice where the methods in the project changed, based on what I encountered in my physical interaction with materials during the making process. This change was possible due to the reflection I made through practice during the process of making as I attuned to the unbalanced spatial qualities in the developing garment. Based on critical assessments I made about the garment’s spatial properties as the pattern was translated into fabric, I altered the making process as I developed it. The hand stitching process that emerges through this project is a practice which I have continued to maintain since, exploring embroidery as a new element of my practice. The Chrysalis Shirts development traces the emergence of a new way of thinking while working with my hands and materials, which requires slowing down. This way of thinking is synthesised later in Dynamic Cutting, my new construction method for garment design, through which I design the form and surface of the garment at the same time. In this cutting practice I merge my tacit knowledge of material creativity and spatial creativity, combining my textile and garment design practices.

I chose to work with shirts, as a means of reflecting further on my use of standard garment styles and pattern blocks when designing. A shirt is a familiar garment type that I had always included variations of in my collections. Considering a shirt as a very specific spatial arrangement of individual pieces that together form a particular garment, I knew the intimacies of these shapes and their relationships well. I wondered how, by exploring a shirt, I could change pattern cutting in my practice. I anticipated that through my familiarity of using shirts in design, that a change in methods of cutting could be explored by introducing something different into the process. In such a way, one change could lead to other changes, which at first are unknown until the process of trialling begins and reflection can be undertaken. I explored this issue in a paper,
‘Making the creation of fashion visible’ [Sgro 2016], presented at CUMULUS: Open Design for E-very-thing, the conference of the International Association of Universities and Colleges of Art, Design and Media.

At first, I tried sketching an idea for how to convey a change in the garment through cutting. As I had witnessed the pupa emerging from within the caterpillar body, I imagined a shirt that had a growth emerging from it, and further, a series of shirts each of which changed in relationship to the other. Therefore, I planned a series of 5-6 shirts, each with a transitioning type of growth emerging from it. I drew my idea in a sketchy manner, a partial expression that I aimed to explore further through pattern cutting.

Figure 4.1 Sketching Chrysalis Shirts.

Figure 4.2 Sketching Chrysalis Shirts.
I initiated the shirt pattern cutting process in a similar way to how I would ordinarily make a shirt. I started with a shirt block pattern. Using flat pattern cutting, I combined this with a paper modelling technique, moving forward the methods I had introduced in Transitioning Garments. The paper modelling technique involved the use of paper and sticky tape to cut and mould a sculptural paper form roughly that I could then integrate into the shirt block pattern. This is similar in principle to the method that Sato [2014] describes which he calls ‘box integration’ [pp. 13-20]. In ‘box integration’ Sato creates a model for 3D shaping extended from a bodice by creating a box in paper and attaching it with masking tape to a bodice toile.

Once I had created the paper model representing the growth I experimented with placing it on top of the shirt toile to find a position where it could be attached. In this way I explored how the paper model could represent a growth emerging from this standard shirt shape. I then made a new shirt pattern that integrated the paper model, by marking out the position on the toile where it would be attached and transferring this set of marks to the paper pattern.

When I remade the toile of the shirt and assessed the progress, I realised the result was not at all what I had envisaged. Instead of expressing a dynamic change, it appeared static and very much a failure of translation. My experiment just looked like a regular shirt with an awkward shape protruding from it. I put the shirt experiments aside but continued to think how best to express my interpretation of the growth I had observed in the chrysalis, by experimenting with pattern cutting.

After some time had passed I returned to work with the Chrysalis Shirts project aiming to explore the metaphor of the garment as a chrysalis formation in a new way. This time, I decided to have some shirts made first, which I could explore changing through working with them directly. I organised to have six shirts made in silk satin

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**Figure 4.3** Chrysalis Shirts, awkward representation of growth.
organza. I anticipated beginning with the finished shirts might assist me to focus better on how I could work with them in experimental ways, rather than go through the process of making each one first.

Working with the shirts in my studio, I put one on the mannequin and considered how to re-approach the idea of the expression of growth between each shirt. I used sketching again at this point to plan what I intended to do with the shirt on the stand. The drawings relate how I intended to cut and insert new panels into each shirt.

Working directly on the stand assists in thinking through the pattern cutting process. At this point I experimented with pinning paper onto the garment to mark out design lines. I don’t usually work in such a way with paper on the garment. I found that, of course, the paper shifted around, and to secure the design line placement better, I decided to hand stitch the panel placement instead.

Once I stitched the intended panel lines onto the first shirt, I decided to replicate the same design line placement onto a second shirt. I anticipated that this would give me the same starting point for lines and panels on each shirt, through which I would then be able to express a change in the form across a series of garments. I completed marking out the same intended panel lines in both shirts, using hand stitching.

I worked further by designing with paper and the first shirt. I began to manipulate the paper on the table to find ways to create a self-supporting structure. I anticipated that this structure could be inserted by seaming into the panel lines. This method repeats the same problem with pattern cutting I encountered in the first shirt, however with a different fabric and placement in the shirt. When I assessed the outcome of this process, again I was not convinced it worked well. Rather than express a sense of dynamic change, the results are static.
Journal entry, 21 September 2014.

Each stitch is small
a small gesture
repeated again and again
it builds something bigger than itself
a movement
a flow.

While these experiments aiming to alter pattern cutting in the shirts did not lead to a shift in pattern cutting, an alternate route however emerged. As I started to transfer the design lines to the second shirt, I found that the stitches I made across the surface of the shirt fabric suggested another means of translation. Rather than interpret the chrysalis form through seam cutting, I could instead interpret it through stitching lines onto cloth. This was achieved through becoming attentive to the expression of the material and visual quality of the stitches on the fabric surface. On reflection, I realised that the failure lay in my methods of translation of the idea through pattern cutting using paper forming, a mistake that was inadvertently repeated in the second attempt. The answer then seemed to be to work more directly with the materiality of the shirts and their surface qualities, as an alternate way forward.

It was through the hand stitching of the Chrysalis Shirts that this alternate method developed. As I continued working on the shirts, I began to explore hand stitching as a surface embellishment method, to convey the changes in the chrysalis form I had observed. While this divergence was not the way I anticipated, through it, I was able to attune to the qualities of both the fabric and working directly with it, and then reflect on opportunities that emerge through this interaction. Through stitching I responded more intuitively to the shirts while holding them in my hands. I also started to assess

Figure 4.5 Chrysalis Shirts, working directly with the material and hand stitch.
them for visual cues for design. In the past, hand stitching was something I avoided, preferring to use the efficiency and stability of machine stitching instead. However, through engaging with hand stitching in the shirt experiments, new methods both for practice and for reflecting through practice were initiated through this slower, hand-based activity. I reflected later, as hand-based methods also emerge in my journaling process, that slowness is an important element of altering my practice as it enabled me to reflect both on my practice and through my practice, with more care and consistency. These methods of critical reflection were expanded by creating handmade journals and practicing hand stitching when I needed to think through elements of the research process more carefully. By integrating more handmaking as a supplemental activity to my research process, I was able to use these methods of slow creation to process my thinking. By the end of this thesis writing I have made two full sized crochet blankets, and many smaller embroidered works, as a way of processing my daily writing in the evenings, through hand-based activities.

When stitching the *Chrysalis Shirts* I aimed to translate the subtle sense of change I observed in the chrysalis formation. When looking at the chrysalis formation closely through the stills photography, gradual, moment-to-moment transitions are revealed. As I analysed the chrysalis formation frame by frame and reflected on these observations, I found subtlety in these transitions that aided me to attune more to the subtleness of my own interactions with cloth through hand stitching. Through hand stitching, I started to attune to this moment-to-moment change. Each small mark made by hand adds to others, to progress this sense of subtle change through surface detailing. Through this stitching practice I was able to reflect more on the reason why my slow methods of drawing emerged while I was watching the chrysalides. It was also the slowness of repetitively moving my hand and filling in surface detailing that enabled me to reflect more carefully and critically on what I was observing.

The *Chrysalis Shirts* emerge slowly over time. I put them down and pick them up at various points in time. My stitching progresses very slowly, stitch by stitch. Throughout the process of the Ph.D. I never have time to sit and stitch for days on end to complete them. However, the hand stitching that occurs during the making of these shirts becomes a way to slow my thinking while using my hands. I start to pick up the stitching when I need thinking time, when thinking without using my hands is somehow not enough. When I considered the shirts complete in terms of what I was able to express through them, I then expanded this range of hand-based activities through my emerging embroidery and crochet practices.
4.3 Cutting and constructing textile surface

Before starting this Ph.D. I had occasionally created textiles and garments using piecing methods. Piecing methods refer to construction using cutting and machine stitching, involving the seaming together of smaller pieces of cloth to make larger ones. The purpose of making these works was to use leftover pieces of fabric in my studio—pieces that were too small to use for cutting garment patterns, but too big to easily discard of. I had often created striped textile constructions from them, by cutting up and restitching different fabrics together into one cloth to create different visual arrangements using colour. I refer to this method of constructing textiles as Striped Construction. In Striped Construction, I worked directly with the fabric, cutting and restitching by eye, without using any patterns or templates for cutting. Sometimes I made one-off garments for myself out of the constructed cloth, other times I made gifts for friends, such as cushion covers. In the past, I did not document the outcomes of my Striped Constructions, and unfortunately, no longer have the works. I didn’t consider this process of textile making to be associated with my conventional practice of pattern cutting, as I did not incorporate this practice into my business.

As a piecing method the Striped Construction process shares qualities with quilting techniques. However, I have not applied it to make quilts or other traditional textiles associated with quilting. Traditional quilting methods often involve the use of repetitive units using specific shapes and shape templates. These units when stitched together create regular, constructed pattern designs in the resulting pieced cloth. In the case of Striped Construction, I work directly with the fabric, cutting and restitching by eye, without using any patterns or templates for cutting. The resulting constructed textiles, therefore, have a freehand quality; they are individually varied, based on how I work directly with cloth. The resulting colour combinations and patterns in the cloth were individually varied each time.
Alongside my conventional practice of fashion design, I have exhibited textile designs regularly in contexts such as design weeks and gallery exhibitions. However, until this point, I didn’t acknowledge connections between my fashion and textile design practices. When I realised that the method of Striped Construction kept reappearing within my practice, I felt it warranted closer consideration. By reflecting more on this process of making individually constructed cloths and exploring new opportunities to develop visual arrangements using this method, I have recognised that this contributes a particular type of material practice through which I have developed tacit knowledge of both visual and material affordances in cloth. Through Striped Construction the qualities of cloth become activated. I started to realise that it was through this experience of cloth construction that I could experiment with pattern cutting for fashion design further.

When the significance of the Striped Construction method became apparent, I made some newly constructed textiles to enable further reflection on methods of cutting and constructing cloth. These serve as examples of what I mean when I refer to the Striped Construction method, and how I made visual arrangements by combining different cloth and colours. As a slow and time-consuming method, this did not align with the pricing strategy of my business and hence I have always considered it a peripheral practice.

Figure 4.9 Striped Construction with ikat (opposite).
4.4 Project 4: Reconstructed Textiles

Project 4 includes textile works that evolve a new method for cutting and constructing textile surfaces, which I call Striped Reconstruction. This includes the series of three works—Dislocations, and the large-scale work—Cloud-scape. Early in the Ph.D., Striped Construction reappeared in my practice when I began to explore ways to transfer what I had encountered in my Becoming-a-lepidopterist study. In my secondary research on butterfly metamorphosis, I encountered a diagram that I found thought-provoking. This diagram by Dr. H. Frederik Nijhout [1991], is a template that represents the possible permutations in butterfly wing pattern development. It shows the butterfly wing surface divided internally by veins. The sections of the wing between each vein grow independently of the others, but overall create the patterning that is unique to individual butterfly species. Looking at this diagram, I imagined how I might be able to transfer the effect of dislocation in the wing patterning by using my Striped Construction textile method, combined with printed image. What I mean by dislocation is the visual effect of discontinuity that is evident between any two segments in the wing pattern, because the markings do not match exactly across each vein. In the past, I had not explored cutting with printed textiles with the Striped Construction method, instead working only with plain coloured fabrics I had kept as offcuts. The works produced for Reconstructed Textiles, including the Dislocations series and Cloud-scape involved working with silk organza fabric, printed with artwork designed by Armando Chant in both silk screen printing and digital print formats. I use the term Striped Reconstruction to refer to how I transitioned my existing Striped Construction method through image displacement.

4.4.1 Dislocations

The fabric preparation for Dislocations involved silk screen printed textiles. The prints were single image, halftone prints, prepared in black and white versions on silk organza. I anticipated that through using silk organza, I could explore the transparent qualities of the cloth to emphasise the visual effect of seam construction. Meanwhile, I aimed to explore the development of the Striped Reconstruction method, by translating my observation of dislocation in the wing patterning, through seam construction, using printed image.

Dislocations I, II and III were designed as a series of hanging textile works. Each individual work differs from the other through colour combinations. These textiles were produced through exploration of the Striped Reconstruction method, whereby the silk screen printed
image was dislocated through developing the method of construction. The process of making each work involved cutting each textile print on a flat surface into 1-inch strips, sandwiched together between paper, with a layer of plain organza. Then, I reconstructed each printed image by successively stitching each strip together, alternating with plain organza in between.

I used the Striped Reconstruction technique to alter the reconstruction of the original print image, through the effects of seaming. Every time I stitched a seam, part of the image is removed, as it becomes included within the 6mm seam allowance. This might seem a small amount, but in the context of the textile design, it changes the image significantly by repetition, when all of the seams are added together. When constructing the work, I further manipulated the image by adding in strips of plain silk organza between each printed strip. This had the effect of stretching the image vertically. Dislocation was also enacted by shifting the position of each strip more to the left or more to the right with each seam construction. Through this process, a unique edge finish was developed for each work, as the placement of each strip created variation in the row ends, which formed the side edges of the textile. In this manner, piece by piece, I created an overall effect of movement and change within the textile work, in relation to the more static quality of the original image and its rectangular format. This explains my introduction of the term, Reconstructed Textiles, to describe this method. Working with a printed image enables the reconstruction of that image to be carried out during the construction process, in a way that pushed the potential of the Striped Construction method further, using a printed fabric.
4.4.2 Cloud-scape

*Cloud-scape* is a textile work through which I explored the *Reconstructed Textiles* method on a more significant scale. *Cloud-scape* is the largest textile work I have constructed to date, measuring 3m x 2m. For this work, I built on the *Reconstructed Textiles* method I developed in *Dislocations*, however, expanding it this time by using multiple copies of the image. Through this multiplicity, I anticipated that the potential of the *Reconstructed Textiles* method for altering the original image could be further explored. Fifteen copies of the same digitally printed image were prepared and eight were cut for the textile reconstruction. These eight digital prints were first laid up together, sandwiched between paper, and cut into one-inch strips. At the start of cutting, I planned to produce *Cloud-scape* as two separate textile works that could be hung to mirror each other in the gallery. However, in the process of construction, an opportunity to create one large work emerged by joining two individual works together.

Before constructing *Cloud-scape*, I anticipated that by using multiple copies of the same image, I might be able to evolve the *Striped Reconstruction* method further. The exact way forward, however, emerged during the construction process, as I worked with what I could see developing through the *Striped Reconstruction* method and adapted the technique in response. Before starting the construction process, I laid out all the individually cut fabric, still as sets of eight layers between paper, and numbered them in the same order that they were cut in.

![Figure 4.13](image1) Eight layers of a single image were aligned before cutting.

Working set by set, I separated some of the strips piece by piece. Then, working piece by piece, I started to stitch them together with 6mm seams. I noticed how the seams formed visible lines in the silk organza, drawing attention to their placement, as a repetitive visual element. As I worked forward, I started to stretch the image through the reconstruction process, by using multiple layers from each set and stitching them in sections together, before then joining them to the strips in the next set.

![Figure 4.14](image2) The image was dislocated horizontally through cutting and joining in multiple layers.
I started to vary the number of layers I used from each set; the exact number was decided as I constructed in response to how the reconstructed textile looked. I varied the placement of each strip up or down in relation to each other, creating uneven row ends and forming the jagged edging of the piece. This carried forward the edge finish technique I developed for *Dislocations*.

As the *Reconstructed Textiles* method developed further, I evolved the technique by adding in more than one layer at a time during the seam construction. Therefore, I not only reconstructed the image horizontally through joining multiple layers but enhanced the visual mix of transparency and opacity as well, through vertical layering. I inserted the additional layers into some seams by aligning two strips together on the left edge before stitching them to the stripe construction. Then, when joining in the next new piece, I left the top layer free, only stitching the lower two pieces. Hence, when the additional layers are joined in, this is only on the left side of each stripe, not the right side. In this way, I added surface dimension and visual interest to *Cloud-scape* by using the material affordances of the silk organza fabric directly. What results through this process is an undulating lift in the surface of *Cloud-scape*. Some of the strips of fabric stand up vertically and diagonally from the left side of each seam. This evolution in the technique creates added dimension and depth in the resulting work.

In the process of creating *Cloud-scape* I realised that I worked in a very immediate and responsive way with the qualities of cloth, when specifically making this work. The method itself is technically simple; it involves plain seam construction. However, there is a whole range of complex interactions in the way I work through construction to design a series of subtle visual nuances through both repetition and variation of this seam construction. This influences the resulting design of the textile. Through moment by moment observation and reflection while in the process of making the work, designing happens during the construction of the textile. *Material creativity* is enhanced by careful observation and reflection while making.

The final way that this responsiveness to material affordances is evidenced is by how the work was completed. I repeated the process above to create the second work. However, when I placed the two completed works on the table and looked at them together, I realised that by joining them, more visual impact could be drawn by doubling the scale in a single work, rather than staying as two separate works. Suddenly, the final version of *Cloud-scape* appeared like a mirage in front of me. This effect of placing the two textile works on top of each other, and mirroring them, led me to devise a way to stitch the work together, which produced the final result.
4.5 Project 5: Dynamic Garments

The final project in my research, Dynamic Garments, involves the synthesis of cutting experimentation undertaken in the earlier four projects. In this final series of garments I experiment with a new method of cutting I call Dynamic Cutting. This method involves creating unique and individually shaped garments by cutting cloth directly, resulting from exploring the dynamic opportunities when cutting by hand, which individual cloth enables. In each of these experimental garments I do not create a paper pattern, finally transforming the production of garments in my practice away from the notion of repetition, towards variation made possible through pattern cutting with the fabric directly. Through this method I combine the tacit knowledge formed through my pattern cutting and textile practices much more closely, to evolve both the material creativity and the spatial creativity involved in creating the garment at the same time. This results in a new method of experimental pattern cutting which I call Dynamic Cutting. Through responding to both the material and spatial qualities afforded through working with fabric and cutting directly, this technique enables unique and individually formed garments to be constructed using this method, underpinning the transformation of my practice towards identifying as artisanal. The garment outcomes collectively are called Dynamic Garments. This is a series of works including Dynamic Dress I & II, Ikat Garment I & II, Fractured Garment and Dynamic Morphotex. Dynamic Garments represents a collection of complete and incomplete garments, which explore the development and application of the Dynamic Cutting method.

4.5.1 Dynamic Dress I and Dynamic Dress II

Using insights from the Reconstructed Textiles project, combined with insights from Transitioning Garments, I aimed to explore how to design garments directly with cloth, rather than a pattern. Reflection on the Reconstructed Textiles project revealed a close encounter
with cloth that involves my sensory perception. I realized I have an intimate, nuanced relationship with cloth through direct handling and assessment of material affordances when designing. The material affordances that I am familiar with through handling cloth include both visual and tactile analysis—how the cloth feels, looks, falls or otherwise performs, as I am working with it.

The Dynamic Garments project began with questioning why I needed to use a pattern in the design of the garment. Each garment cut with the Dynamic Cutting method begins with a different type of cloth or combination of cloth. There is no paper pattern used or produced as a result of this method. Dynamic Dress I and Dynamic Dress II began with fragments of digitally printed silk-satin organza, left over from the Transitioning Garments project. Dynamic Dress I is made from remnants of Transitioning Garments: Series II, while Dynamic Dress II is made from remnants of Transitioning Garments: Series I.

In Dynamic Cutting, an emphasis is placed on exploring the relationships between the surface and form of the garment as they are designed together through cutting and seaming cloth. This approach finally creates synergy between design and pattern cutting, the separation of which in my conventional practice had formed the impetus for this research. The design of each garment in this project is formed through cutting. Dynamic Cutting explores possibilities to define individual outcomes through engagement with the affordances of material, combined with cutting using spatial creativity.

I kept the fabric remnants from the Transitioning Garments since as fragments, they had strong, visual qualities. Later I saw potential that they could be constructed in exploratory ways by stitching them into new outcomes, such as through my method of Constructed Textiles. The visual nature of the fragments was creatively suggestive; they were interesting to me. While they were remnants of another cutting process, they suggested future design possibilities yet to be explored.

When constructing Dynamic Dress I and Dynamic Dress II, I relied on a similar process, yet the outcomes differ due to the variations in each construction experience as I responded to the various pieces of the printed fabric used. I worked with the fragmented pieces of cloth by hand, to explore cutting and sewing them together in new ways. Piece by piece, I considered how each cloth fragment could join to others by cutting and stitching them. I explored visual juxtapositions to create a sense of movement across the surface when constructing seams in the developing garment.

This carried forward the method of visual juxtaposition across seam placement that I had explored in Transitioning Garments and Reconstructed Textiles. This process also enables a slow practice to be formed through cutting, transferring the quality of reflection through slow practice, which I had previously encountered through stitching and drawing. The form of Dynamic Dress I develops slowly, emerging from the combination of individual cuts and seam construction. Each step in the process builds on others while enabling the process to continue. Through this method, the 3D form of the garment is created at the same time as the surface, guided by the intimacy of my material engagement and tacit knowledge. The cloth is manipulated directly and developed piece by piece.

![Figure 4.17 Starting to cut using fragments of cloth.](image)
As the method of Dynamic Cutting proceeds for each dress, there is a period of development when each dress exists as a fabric construction. This means that it is not yet a finalized, definable garment outcome. Through manipulating the fabric construction in my hands, I found ways to make shapes in the cloth that could be explored directly for garment development. I moved the fabric around, turned it this way and that way, to locate possibilities for evolving the construction of the garment. The shapes I created in the constructed fabric included corners, curves, and small pyramids, generating undulations in the surface of the fabric construction that can be inverted or extended for further manipulation and explorations in cutting and forming. These undulations can be stitched to other pieces in multiple ways. Volumes can be joined together to make bigger fabric constructions or expanded by connecting more individual cloth fragments. Given the variability within the technique of cutting and constructing, there are no right or wrong ways to cut, only explorations that enable different paths in cutting to be taken.

The developing fabric construction can also be re-cut in the process. It can be rotated, shortened, folded, repositioned or otherwise altered through stitching as the process continues. In each instance of cutting, decisions impact further opportunities for cutting and construction. In this way, through cutting and constructing, I create surface details that inform the overall shape of the garment form and its final design. The garment design is finalized only at the end of the cutting and construction process, representing the accumulation of many, smaller, design decisions along the way.

At times I worked with the fabric construction on the pressing table, at the sewing machine, or on the cutting table, independently of a mannequin. These methods allowed me to play with the fabric construction and assess it for surface shape creation irrespective of a defined style or predetermined garment. Once the fabric construction is sizeable, I started to evaluate how it could orient towards the body, by using the mannequin as a stand and draping the constructed textile. At various times, I put the fabric construction on my own body and assessed the shapes and visual dynamic of the fabric construction using a mirror. At some point in the process I cut a hole in the fabric construction for a head. This made it easier to continue to work with the fabric construction on the stand and to start to define the garment outcome. However, this hole could be alternatively positioned; it can become a hole for an arm or a leg, for example. The fabric construction, therefore, remained flexible; it could still be turned many ways, for different shape expressions.

When I was draping the fabric construction, I aimed to suspend defining the exact garment outcome until the later stages of development. On the stand, I photographed the fabric construction, manipulating it in various ways to assess it for different options that suggested what the final garment form might become. I established an understanding of how the fabric construction falls, its weight and distribution. This analysis supported further decision-making in the design process, as, piece by piece, the fabric construction expanded in size. I continued explorations on the stand with the intention to keep fabric construction as flexible as possible in its orientation toward the body. This extensive research process enabled the form to retain variability until the later stages of the garment development.
I used the *Dynamic Cutting* method to create three-dimensionality in the garment, exploring the developing fabric construction for possibilities to create shaping in the textile surface. Shaping was created by using smaller and differently shaped pieces, contrasting with the *Reconstructed Textiles* technique, which relied on strips. In such a way, the form of the garment is designed at the same time as the textile construction. This is why I call this method *Dynamic Cutting*. In my conventional practice, flat pattern cutting methods were used to create conventional garment shaping using elements such as darts, pleats, and tucks. By contrast, in *Dynamic Cutting*, shaping is created by piecing the fabric through cutting and stitching. In this way volumes can be integrated into the textile surface which can then be used to create shaping in the garment through a series of more complex and nuanced cuts. Shaping is therefore created and alterable within each seam construction.

*Dynamic Dress I* and *Dynamic Dress II* revealed how variations can be expressed in the final garment forms. These dresses retain flexibility meaning that they can be oriented in different ways towards the body. For example, I developed the cutting and construction in such a way so that there is no fixed back and front—they can be worn either way. As garment forms, they express flexibility due to the *Dynamic Cutting* method and design decisions made within this process. Rather than result in a garment that has a correct orientation, the works were intentionally designed to have possibilities for how they can be worn and interpreted. The outcomes from this process aimed to express variation and individuality in cutting, in a way that retains flexibility in the garment. Each garment design is created to enhance both *material creativity* and *spatial creativity* in my cutting process as a result.

Figure 4.22  Dynamic Dress I (this page).

Figure 4.23  Dynamic Dress II (opposite).
4.5.2 Ikat Garment I and Ikat Garment II

Journal entry, 3 March 2015.
Think back to the chrysalis formation
it was moving from within
but forming (in sight) on the outside/surface
a double movement.

Ikat Garment I and Ikat Garment II represent one complete and incomplete garment respectively. During several visits to India that I made throughout this Ph.D., I encountered new access to textile sourcing and production supply. Ikat cloth is created by first dyeing or painting individual threads with the pattern design and then weaving the cloth. As a result of this process, the visual motifs do not have sharp edges like prints, but soften and blur, as each thread is woven to create the visual pattern. Many ikat cloths have distinctive patterns and colours that distinguish regional designs. I selected the fabric for its minimalist, graphic qualities, rather than for its cultural significance. I sourced a variety of cloths in a colour range limited to black and ecru. Each cloth has similar, yet varying geometric designs. I anticipated that I could use each cloth to explore variation in surface design when cutting the garments, based on how I could combine each with the others.

Together with fabric sourcing, I initiated a collaboration with The Stitching Project, a Rajasthan-based, social enterprise initiative. Located in Pushkar, The Stitching Project supports local women to develop skilled work for international trade. This collaboration enabled me to explore the integration of hand stitching with garment design, in a way that draws together prior explorations with hand stitching. As an exchange, the collaboration enabled The Stitching Project to respond to a brief from an unfamiliar designer, expanding the women’s confidence in their abilities to transfer their skills. I intend to continue working with The Stitching Project beyond the end of this Ph.D.

Figure 4.24 Cloth fragments, hand stitched by The Stitching Project.
as it enables a way for me to continue to design the surface qualities of my garments, while achieving scale, which assists further integration of hand stitching in my practice beyond my own hand-based experiments.

I prepared fragments of cut cloth for stitching, based on shapes that had appeared in pattern cutting investigations previously. In the past I had retained photocopies of shape enlargements from Transitioning Garments Series II due to the visual possibilities these suggested. I now used these photocopies to cut new shapes from the sourced ikat cloths and black silk-satin organza. I provided the fabric fragments to The Stitching Project, with directions for how I would like them stitched. I anticipated that by combining fragmentary shapes with running stitch, that cutting and construction could be explored in new ways for designed outcomes.

Further experiments with Dynamic Cutting were then undertaken. Using the ikat cloth combined with the hand stitched fragments, I developed the cutting in response to the qualities of the fabrics. When cutting the ikat cloth, I responded to the square, visual grids of the textile design. The motifs in each ikat cloth I selected are arranged in block repeats. This means that the motifs form regular square grids that extend horizontally and vertically across the fabric surface. I developed the cutting to include and emphasize these square grids, and therefore, seam lines run parallel to them. The cutting became more variable as I joined in the hand stitched fragments, which are a collection of different shapes.

The experience of cutting and constructing with the ikat cloth also means that the garment falls and drapes differently from those constructed using my previous fabric choices. The material affordances of each cloth are different. The ikat cloth is heavier than the silk-satin organza, and different effects of fabric drape are therefore considerations for developing Ikat Garment I and Ikat Garment II. This evolution of the Dynamic Cutting method emphasizes visual juxtapositions in order to develop the surface design of the garment at the same

Figure 4.25 Ikat Garment I.
time as its form. In the process of creating the fabric construction, different orientations of the garment are trialled on the stand, which again demonstrates the variability of the garments created when using this method. When reflecting further on the outcomes of *Ikat Garment I* and *Ikat Garment II*, it is evident that variations in the resulting complete and incomplete garment evidence considered responses to each cloth, and the way that particular combinations of cloth are made, moment by moment, piece by piece.

### 4.5.3 Fractured Garment

*Fractured Garment* is an incomplete garment made using silk-satin organza, combined with some of the hand stitched textile fragments. Exploring the *Dynamic Cutting* method further, I cut and constructed this experimental garment differently, based on my responses to the potential within the fabric. This time, I developed a more fractured, undulating garment construction that emphasized lightness and bounce, qualities that are particular to the chosen fabrics, representing specific material affordances. Using the fabric remnants, combined this time with white, nude and ultramarine coloured silk-satin organza, the *Dynamic Cutting* method evolved to express the dynamic mix of lightness and colour, which this combination enabled. There is movement expressed in the garment through the more complex fracturing that is created in the fabric construction.

Reflecting on *Fractured Garment*, I recognize that the way I piece the fabric construction could be seen to align with constructed textile design approaches that emphasize piecing and visible seam construction. Such methods are found in contemporary interpretations of traditional Korean textiles known as Bojagi, or Pojagi. Bojagi are traditional cloths...
used for wrapping and a community of practice exists around the biennial Korea Bojagi Forum [Korea Bojagi Forum 2016]. Contemporary textile artists adapt this technique in different ways for garments, textiles, installations, and sculptural works. This traditional method involves the construction of a textile design by piecing often differently shaped, coloured or patterned cloth, using seams that are self-enclosed but visible. The seams are traditionally encased but become visible elements when constructed using transparent and semi-opaque cloth such as ramie or silk organza, which serve to emphasize the seam-work [Lee n.d.]. Examples of contemporary artists using this technique are Leonie Castelino [Castelino 2017] and Yolanda Sanchez [Sanchez 2011]. I foresee that exploring Bojagi techniques further, including hand stitching and seaming methods, can inform the development of seam construction finishes for future applications of the Dynamic Cutting method, especially when using lightweight silk cloths, such as I did.
Figures 4.28 - 4.29  Fractured Garment (this page and opposite).
4.5.4 Dynamic Morphotex

In my final material choice for my Ph.D. project, I explored the Dynamic Cutting method using the fabric that was the catalyst for my Ph.D. journey. Dynamic Morphotex is an incomplete garment, through which I demonstrate the potential of using a method such as Dynamic Cutting to create individual responses using cloth in a way which enhances material creativity and spatial creativity in the process of cutting. By comparing the original Morphotex Dress and this final work for the research, a clear development can be shown through observing changes to the methods I previously used in my conventional practice of pattern cutting. As a result of the range of smaller changes made in each project, the development of my Dynamic Cutting method achieves an overall change in my practice, through which I design through cutting, instead of through drawing. This is my metamorphosis.

I prepared the Morphotex fabric for use in Dynamic Cutting by first working with a local silk screen printer, Screenhaus, to create an additional visual dynamic in the fabric surface through screen printing. As the Morphotex fabric has particular light reflective properties, we aimed to enhance this. Hence, we considered the appropriate pigments to use in order to explore the fabric qualities further. After experimenting with different types of pigments and colours, I decided on a pigment that is usually used for paper printing, as it had a quality of sinking into the fabric and drawing out the light reflective qualities further, rather than sitting on top of the fabric as textile pigments tend to.

I started with an illustration of Dynamic Dress I, which I had previously produced when exploring methods for communicating the dynamic nature of cutting involved in the garment's creation. I adapted this illustration to prepare some screens for printing. Prints were prepared on Morphotex, then I spent some time experimenting with cutting and constructing the resulting material. When experimenting with Dynamic Cutting and Morphotex, I again found an evolution of the Dynamic Cutting method, in response to the material affordances of the fabric. This time, as I created the fabric construction I started to stitch French seams. I then reversed these seams so that the seam allowance formed ridges on the visible side of the garment. Compared to the qualities of plain seam construction, these ridges assisted in creating a stronger graphic dimension and structural quality to the resulting fabric construction. Working with these seams further, I manipulated them by turning and curving and found that more interesting undulations in the garment construction could be created in such a way. The Dynamic Morphotex fabric construction, therefore, has different seam treatments to the earlier Dynamic Garments. These seam developments evolved through manipulating the Morphotex fabric construction directly. Working with Morphotex fabric in this way, I found that there was a much more synchronised integration of material creativity and spatial creativity than I experienced when working with this fabric using my conventional pattern cutting practice.
Figure 4.30  Drawing of Dynamic Dress I adapted for silkscreen print (this page).

Figure 4.31  Dynamic Morphetic (opposite).
4.6 Reflection -in and -on cutting

When working with the Dynamic Garments I was searching for a way to evidence the emphasis on movement that occurs through this type of cutting and construction. With this aim, I expanded the use of video, together with stills photography, as methods for recording and reflecting on my design process. When recording, I used a stripe fabric for my cutting and construction process. The stripe fabric assisted to demonstrate more clearly how the technique involves both visual and material properties while cutting and constructing the garment form. The stripe draws attention to the visual direction present in the fabric surface, which I cut against and with in Dynamic Cutting. This means that sometimes I cut in the same direction as the stripe and other times I cut against it, forming visual juxtapositions in the resulting construction. As a result, I mix my use of the fabric grain within each garment.

In the video Making Form [Sgro 2015] the activities of my hands demonstrate the many small interactions with cloth that occur in the Dynamic Cutting process. The video method reveals how decisions are made through directly handling the material and its progressive construction. The video shows pauses and hesitations, along with decision-making, which evolves the shape of the developing fabric construction and reflects my rhythm of making. This video demonstrates how I use the directional visual aspect of the stripe, together with how the fabric construction looks and behaves, to decide moment by moment how to cut and to construct. In this way, design as intention emerges through cutting and constructing with material affordances.

Using still photography, I documented the development of the fabric construction and Dynamic Dresses. The still photography communicates the variability in these forms, both in their partial forms as fabric constructions and their final garment outcomes. By placing

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![Figure 4.32](image1.png)  
**Figure 4.32** Cutting against and with the fabric.

![Figure 4.33](image2.png)  
**Figure 4.33** Handling stripe fabric, Making Form [Sgro 2015] (<http://vimeo.com/donnasgro/making-form> film stills).
the work behind a screen, I drew focus to how the silhouette of the garment can change through many variations in fabric placement when constructing. Using these methods, I made a series of stop-motion videos, relating the transitions of the garments and the fabric constructions. I used the videos to better reflect on how shape and silhouette can be developed in the garment before the final garment outcome is decided.

The Dynamic Cutting method is a slow, gradual process of design, merging textile and garment cutting construction, and linking 2D and 3D spatial knowledge through cutting and construction. The slowness of the process allowed a deeper engagement with reflective thinking to be incorporated into the design process. Alongside this, increased documentation of the process using visual methods underpins the expansion of reflection-in and -on practice. My practice, therefore, engaged more successfully with 'reflection-in-action' and 'reflection-on-action' [Schön 1983, pp. 49-54] than it did before. In this way, the method enabled the surfacing of tacit knowledge concerning design, cutting, and construction in a practical and integrated way.

Using video and still photography further, I reflected on making, seeing it as a series of micro movements between my hands and materials that involves my full perceptive awareness and aesthetic judgment. When making videos, I focused on what my hands were doing, as a way to understand more about how I am thinking through using my hands. Watching my hands back, I am suddenly outside of this movement, able to better reflect through bearing witness to what my hands do. Working up these photographs with arrows,
I analysed parts of the recording in order to focus on the details of these movements. The film stills reveal complexity and nuance in the interaction between my hands and cloth.

Thinking through making is revealed in the particular micro movements of my fingers and the behaviours of my hands. Fingers move dexterously, using finger pads and tips—the fabric moves between fingers, fingers slide along, folding creases in the fabric—scrunching, tightening, loosening, sometimes losing grip—slipping and catching, twiddling or fiddling with fabric. Fingers use pins to prick the fabric, to join it together, to space fabric ease or tighten it. Fingers use pins at the machine to slide the fabric under the moving presser foot, to align fabric pieces together, to smooth out. Embedded within all these practical movements is thinking that directs the design of the outcome.

Meanwhile, my hands reach, pull closer, move apart, separate, use the scissors to cut, and slice, or snip, or clip, or trim, or cut—out across, up, or down. Sometimes I hold my hands closer to my face, or closer to the machine, closer to the table, or the mannequin. Sometimes I push my hands away with the fabric floating between them, out and across the table. Sometimes I pull everything close towards me and collect cuts and snips of fabric with everything else. Sometimes my hands make a huge mess of cutting paper and scraps of fabric, pins, chalk, pencils, scissors, snips, threads, and offcuts. Sometimes all the pins find their way everywhere. At times I push everything away, the mess of equipment and fabric, and empty the table in one fell swoop.

To underpin the expansion and development of experimental pattern cutting requires that the process is shown in stages of development. Identifying how changes happen gradually and also build from one project to the next is important for surfacing tacit knowledge inherent within a creative practice. This is also useful information about the nature of tacit knowledge for design practice research and other designers.
4.7 Chapter 4 concluding remarks

In Dynamic Cutting, design through pattern cutting occurs by responding directly to the material affordances of cloth, and the spatial variabilities that the cutting and forming of cloth enables. Through this method, garment design and pattern cutting now operate together with increased synergy in my practice. Through Dynamic Cutting, a future direction for my practice is enabled. Further explorations with Dynamic Cutting can still be made with the potential for variability based on the selection of both different cloth or materials and different types of garments. This is an exciting and significant development in my practice, which will enable me to create both textile and garment works into the future, in an exploratory and highly individual way.

Dynamic Cutting demonstrated that garment cut can be developed without the use of conventional pattern cutting techniques, such as methods using paper patterns which act as templates for reproduction. As a highly variable, and individual method of cutting, this enabled material creativity and spatial creativity to be enhanced and developed. Dynamic Cutting is an inherently slow but playful and versatile approach, through which I can spend more time researching material affordances using my hands when cutting and constructing. In this method I embed artisanal practices, which uniquely define my practice through the use of my own individual hand and distinct tacit knowledge.

I anticipate that the Dynamic Cutting method can be developed in many different ways, and look forward to progressing the method in the future through further iterations. Examples of different explorations with cloth may include digital and silk screen printed imagery. The method might also be developed through exploration with seam finish techniques and applications. Seam finishes were given minimal attention in Dynamic Garments because my focus was on developing cut. However, I anticipate this will be a promising area for development. I feel that developing seam application tests using Bojagi seaming techniques could be an insightful way forward here initially, but that seam applications could diversify even further by expanding materials and responding to their specific affordances. The garments I have developed using this method are limited to dresses. This limitation also signals further possibilities to explore Dynamic Cutting through developing different types of garment outcomes.
Chapter 5

CONCLUSION
My research set out to examine how creativity in fashion design could be activated through experimental pattern cutting. The separation of design and pattern cutting, established through habitual fashion design practice, had underpinned my systematic application of conventional methods, which in turn limited creativity. My study is the first to provide evidence for how material and spatial knowledge, formed through an artisanal practice of pattern cutting, can be activated to expand creativity in cutting. To provide more than anecdotal evidence, I developed exploratory research methods to guide the development of my practice-based research methodology. My practice of fashion design and pattern cutting evolved together with the expansion of strategies for reflection on and through these practices as they were carried out by hand. My research, therefore, provides an original contribution to fashion design practice and creative pattern cutting through this explicit account of my practice and the practice-based research methods that I developed through this disclosure.

 Dynamic Cutting is a new method of garment cutting that forms the significant contribution of this research to the field of creative pattern cutting. This field of practice and research is experiencing renewal and expansion, and part of this involves providing better accounts of how tacit knowledge underpins creative development in artisanal fashion design practices. Dynamic Cutting is a method that involves designing the surface and form of the garment simultaneously. This immersive activity requires a highly attuned, hand-based engagement that activates material creativity and spatial creativity. Dynamic Cutting involves questioning the very notion of patterns as templates. Therefore, through this method, I demonstrate a way to shift the frame of reference for creativity in pattern cutting beyond established conventions connected to the industrialisation of pattern cutting and values that underpin this legacy. Instead, through embodying alternative values of variation and difference, pattern cutting is emphasised as a method that enables unique and individual creative outcomes. Dynamic Cutting demonstrates these values and its significance lies in the future potential it promises as a method for the facilitation of ongoing iteration and development.

In contemporary fashion design practice, there is an existing gap in knowledge concerning the myriad of individual creative processes that fashion designers develop in sites of small-scale, artisanal practice. My research has provided a deeper insight into how tacit knowledge impacts creativity in this area of fashion design practice that involves making by hand. Through my investigation, I have extended upon notions of ‘creativity’ in fashion design through analysing my experience in my practice of designing. This extension through new notions of creativity assists to counter ambiguity in how fashion design creativity can be understood, together with offering a new frame of reference beyond market orientated fashion design. When attuning more closely to my tacit knowledge formed through fashion design practice, I found that this was shaped in two ways. The term material creativity refers to the creativity a practitioner experiences when designing and making garments through individual engagement with materials. The term spatial creativity refers to the creativity a practitioner experiences when working with and analysing patterns in both 2D and 3D forms. My contribution to fashion design practice through this articulation of my practice is to offer a new framework for thinking through, reflecting upon and expanding notions of creativity in fashion design using tacit, hand-based engagement with pattern cutting.
Figure 5.1 shows the relationship between tacit knowledge, the butterfly metamorphosis study, development of metaphors and experimental pattern cutting using spatial experiments and material experiments. The representation indicates that spatial and material variables...
are distinct. However, there can be overlap in practice. This is represented by the dashed line and zone of overlap. Tacit knowledge is represented as embedded - it is at the core of the practice as embodied knowledge. The butterfly metamorphosis study is research which is used to expand the practice conceptually while underpinning the development of metaphoric analysis. New projects occur in trajectories, moving from tacit knowledge through conceptual development, including metaphoric analysis. New projects move through the field of spatial and material variables and then integrates as tacit knowledge. The represented trajectory shows how Dynamic Cutting joins both material and spatial variables. However, alternative trajectories are possible with incomplete paths, or paths that are differently oriented around the centre pivot, passing through material or spatial variables only, or joining them.

There are limitations to any practice-based research enquiry. These limitations are due to the localised nature of the design practice out of which the research emerges. As such, my study is both enabled and limited by the nature of my practice, my personal experience, and potential biases. While these limitations are implicit with practice-based research, efforts have been made to carefully consider how my personal experiences and viewpoints influence my interpretation of my research. This type of practice-based research requires an increase in contributions by other practitioners. These contributions are important so that research through fashion design practice continues to critically expand, diversify and develop in ways that are reflective of variations in the field of practice. Designers at many different levels can benefit from the increased representation of hand-based experimentation, accompanied by a more explicit range of discussions about material and spatial knowledge encountered in practice. It is therefore imperative that established designers with many years of experience, as well as emerging designers contribute towards expanding accounts of how creativity through manual pattern cutting is stimulated and enhanced. Further study of fashion design from practitioner perspectives is critical for broadening research in the disciplines of fashion design and creative pattern cutting.

Additionally, this further study will strengthen accounts of fashion design practice within both design research and creative practice research communities, where hand-based fashion design methods remain under-explored as valuable research tools. More research contributions from individual fashion designers can expand these fields of creative practice, especially as they concern renewed notions of the inherent values of craft and making. My research identifies that fashion design researchers, as skilled makers with a depth of tacit knowledge, have valuable contributions that can be made to the broader creative field.

In the context of my fashion and textile design practice, there are many opportunities to develop both the Reconstructed Textiles and Dynamic Cutting methods further. Dynamic Cutting as a method which involves the design of a surface at the same time as its form embeds movement and change as inherent qualities of cutting. These qualities ensure the continued evolution of this method of cutting. I anticipate that both Reconstructed Textiles and Dynamic Cutting methods can be expanded through the exploration of different types of materials, imagery and image making processes. New explorations that integrate print, embellishment and other surface design methods can enhance how my tacit knowledge of colour, texture, visual rhythm and patterning through cut can be explored. Further variations with alternative materials and their combinations, together with a thorough investigation of seam finish possibilities and internal qualities of the garment are avenues for future development. Both cutting methods can additionally be extended by considering their scale of application and the type of outcome. I further anticipate there are a range of variations between the garment and textile installation yet to be explored using these methods. As inherently flexible methods of cutting, there are many future potentialities which are inherent in these methods, and through continuing to expand their application, my practice will continue to evolve and develop through further exploration. Therefore, the potential for continual transformation through practice becomes a part of the practice itself, supportive of creativity in practice and setting up conditions for innovation in cutting to emerge, and to be sustained.
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The below video works cited in the text are available for online viewing.


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APPENDIX

A conversation about collaborative practice by MAKE.SHIFT Concepts.

Abstract

MAKE.SHIFT Concepts is a Sydney-based collaborative research practice combining textile practitioner, Armando Chant, fashion practitioner, Donna Sgro, and design architect, Olivier Solente. Through the practice, the designers explore trans-disciplinary crossings between fashion, textiles, art and architecture. Each designer brings a particular expertise to the practice, which when combined is expanded into something new. MAKE.SHIFT Concepts have produced two bodies of work for exhibition, CONSTRUCTIONS and TRANSITIONS. The designer interview is conducted in the form of a conversation between the three individuals, who discuss and evaluate the complex interactions that occur in the process of producing creative work between disciplines, and the establishment of a working practice focused on process. The research practice asks the following questions - how can trans-disciplinary practitioners develop a collaborative practice that explores potentialities, and what types of outcomes may result? How may these outcomes expand the disciplinary practices out of which they arise?

CONSTRUCTIONS was the first exhibition of collaborative work from MAKE.SHIFT Concepts. This exhibition was installed at the Damien Minton Annex Space, in Redfern, October 29-November 4, 2012. This exhibition included a series of works including hanging fabric, garments and sculptures, together with projected image. TRANSITIONS was the second exhibition of collaborative work from MAKE.SHIFT Concepts. This exhibition was installed at No Vacancy Gallery in Melbourne, March 26-31, as part of the L’Oreal Melbourne Fashion Festival Cultural Program. This exhibition included a series of outcomes including hanging garments, wood and metal sculptures, and a fashion film.
**Constructing Beginnings**

. . . becomings are never indeterminate or generic; they are always becoming something. Becomings are always specific movements, specific forms of motion and rest, speed and slowness, points and flows of intensity; they are always a multiplicity, the movement or transformation from one “thing” to another that in no way resembles it. (Grosz 1994: 173)

**AC:** It's about possibilities.

**OS:** We discover things as we go.

**AC:** We each see things in the other's work, which we can respond to. We're quite happy for a linear process to be interrupted in a way, and instead of a typical outcome, the change enables a new direction.

**DS:** And that is one of the common understandings we bring to the practice. We each have an openness to chance and opportunity that comes from the disruption of ordinary modes of practice, and being comfortable with that.

**AC:** We're all interested in the idea that from a disciplinary perspective the creative outcomes don't always have to be typical. It doesn't always have to be a garment, a print doesn't always have to be on fabric. Using film and projections is just as much about textiles as anything else. This is the idea of fashion and textiles as always expanded beyond everyday understandings.

**OS:** Donna took the rocks and reworked the pattern, which I'm re-deforming again. I say re-deforming because initially the rocks were made by me digitally deforming a garment pattern Donna made, and now it is being done again, at another stage in the process. And then Armando took all the garments together and instead of doing a print, it's like you are printing on a wall in the film.

**DS:** I guess what we have understood from the start, and something that has drawn us together, is that process is really important to the practice. Exploring and reflecting on the process of creating a work is as important as the resulting work itself.

**AC:** The experimental nature of working together is part of that. We create work in a way that ensures we are happy to lose some of the control over the outcome, because we are more interested in the transitions that happen in the process, and what can be added to it, and how it can be translated further.

**OS:** It will not always be a mutual understanding, but it is interesting to see those dead ends in a way, because we can always come back to them.

**DS:** It's a re-processing, and it's always about the material at hand, and working with the physicality of what we do as makers. Decisions get made in the process of seeing the materials transform, and responding to each other's insights.

**AC:** We never see what we do as an end in itself, it's always leading on to something else, it embodies potential. The way I view the work I do with MAKE.SHIFT Concepts is that I'm learning so much about what I do as a practitioner, and this is really informing projects I do in my individual work. I wouldn't be able to do this project I am doing at the moment, if I hadn't seen for example the garments up against the light of the window, and suddenly realized light is really important here. I see MAKE.SHIFT Concepts as this kind of experimental melting pot, where ideas can be tested and developed further or used to reflect on our individual work practices.

**OS:** We each have our individual creative obsessions, for example, Donna has the butterfly and transformation, Armando has mirroring and doubling, and I have folding and tessellations so we will keep turning around these anyway. We bring these with us into the combined practice, but how they appear is often not expected. It's all about fluidity within our practice. The practice allows us to experiment with different materials and in different ways.

**DS:** And those creative obsessions shift and overlap. We seem to come back to a common concern with structure, form and emotional engagement. And what I see is a common approach is the understanding we have of the importance of the relational nature of our practice. We are more interested in what happens in the in-between spaces, in relationships between things, these areas of potentiality, rather than in what we have already experienced or know as individual practitioners. It is in the unexpected, undefined spaces that we are most interested to develop.

**AC:** It is interesting because textiles and fashion obviously play a part in our practice. But the idea of textiles and fashion in our approach is that these terms are really broad, so yes it could be a projection, or it could be a temporary building.
DS: Or, in fact, it could be a garment.

OS: It's interesting because from the moment Donna said the garment doesn't need to be in the gallery for the exhibition, it freed me in what I could produce because it meant that I just had to return to the pattern of the garment. It may not be entirely obvious to an observer, but the TRANSITIONS exhibition is all about the garment. At first glance it will look like just a video and some sculptures.

A Transitioning Process

Breaks in continuity cut across the notion that events are either acts of nature or social constructs. They make them perceivable in such a crossover in the first place . . . Herein lies the productive potential of interruption and disruption, which, depending upon the context, can be characterized as incidence, but also as accident, defect, mistake, and static noise. (Sick 2011: 11)

DS: Working together there are a series of shifts that are occurring in our processes, as we accommodate each other's creative input and techniques.

OS: I think because we are at a stage where we are actively encouraging exploration of crossovers, we are quite open to everything, including material, techniques and sharing our ideas.

AC: And in those creative crossovers there is that sense of interruption of our usual practices.

DS: And it's been interesting to reflect on how this has manifested both in the processes we have been engaging with, and in the outcomes.

OS: It's definitely about exploring opportunities within the process for us, in terms of practice. And we realize that by doing it by hand, working with materials and also talking to each other, that the process is tested and transformed.

DS: I think the second shift occurred for me with the process I worked through with Olivier, and that was a result of him transforming my original garment patterns from CONSTRUCTIONS into the garment rock mannequins he made for that exhibition.

OS: For CONSTRUCTIONS you both presented me what you had, because you already had started the collaboration and developed the textile prints, so you had the calico toiles and were about to cut the garments. I thought more about the space design for the exhibition and from there came the idea for the garment rock mannequins.

DS: I think at that point we were still thinking about those rocks as a type of mannequin, as a replacement mannequin almost, because I was interested to present the garments in a way that was not about a traditional idea of a body, as I was interested to explore what else it could be. Part of that for me was about exploring the idea of the animal body, and the studies I had conducted with the butterflies were influencing this development of thought.

Figure 1
OS: The idea was not to have human mannequin, to show the garments more artistically, and it ended up being a way to research the geological or biomimetic kind of form making for myself. And this had crossovers with your biomimetic research, and butterfly studies. And we worked with corflute as a way to test these ideas.

DS: And together with the corflute, I worked in calico for the garment rock mannequin covers, because in a way they were like prototypes, and works in progress, in the same way that the garment toiles were.

OS: It was an informative process for me because corflute is plastic, and then I went on to work in wood, and steel for TRANSITIONS so it gave me an opportunity to start to explore all these different materials directly.

DS: For me the process of creating the garment rock mannequins in CONSTRUCTIONS initiated this really interesting way of working and links our practice together, as we started to create a way to work as MAKE.SHIFT Concepts I think and pass the design work back and forth amongst ourselves. The process was quite interesting for me in that I created the initial garment pattern for the 2D garments, and then gave them to Olivier who then transformed them through his practice, to produce the garment rock mannequins.

OS: And then it was interesting when that process happened again, from CONSTRUCTIONS to TRANSITIONS, the way you created new garments out of the patterns from the garment rock mannequins and all those little structural stitching panels completely changed the appearance of the garment.

AC: That's where I think those garments that we developed from CONSTRUCTIONS through to TRANSITIONS were really interesting because we were actually taking those garment rock mannequins, and transformed them back into garments. And through re-considering the usual ways garments need openings for the head and shoulders, the garment rock mannequins became garments again.

DS: And then it becomes really interesting again, once the garments were re-mapped and transformed again by Olivier, to then become the wood and metal sculptures from TRANSITIONS. For me the story of the multiple transformations the original patterns took is really interesting, and manifests the way the process between us has developed.

Process: Analogue and Digital

DS: What has been interesting throughout this initial collaborative process has been the way we have been able to combine the use of multiple digital technologies with more traditional hand techniques.

AC: Yes, we are really interested in working with technology but something we are very passionate about as well is that the use of technology does not become clinical. It is important to our outcomes that there is still a hand feel, an organic feel, and a strong level of emotional engagement in what we do. We use technology for the opportunities it provides; it's a tool. If we produce an object, a sculpture or a garment it has to speak to people's
emotions and their interaction with it, on a human level. In my case, the development of the digital textile prints came about through a complex process of interaction between the techniques of digital and analogue, and through our discussions.

DS: Yes, it was interesting the mix of techniques and processes you applied to create the resulting textiles.

AC: What started as a series of botanical photographs I created, translated through to a series of mono prints on paper, which were then digitally scanned, and graphically manipulated on screen using Photoshop. Using that program enabled the color and scale of the works to be altered dramatically, but because the original artwork had been created by hand, there was already this strong sense of organic mark making to work with. And then, when they were reproduced at full scale as digital textile prints, and printed onto different base cloths, they transformed again due to the variation in transparency and reflection of the fabric surfaces. The series of processes the artwork developed through created these works that have a sense of open interpretation. They are quite abstract and very textural in the end.

OS: It is interesting because the processes we have been working through don’t require more technology. We have been developing a way of working between the three of us where everything we do is quite tangible and hands-on in a way. It is interesting to consider the way Armando has worked to develop the prints, whereas I choose to use digital support in a different way. I’m not sure that Armando could have produced those types of digital print without using Photoshop.

AC: That’s true. For me the use of Photoshop is new; it is not something that was ever part of my training as a textile designer. The creation of the textile prints for CONSTRUCTIONS and TRANSITIONS came about as a way for me to explore the actual computer program itself. The prints developed from an active engagement with experimentation, both by hand and digitally through Photoshop.

OS: Technology can add extra layers of creativity, economy and efficiency that the hand cannot necessarily do, but what is interesting, especially when we developed the garment rock mannequins, was when we printed out the pattern and discovered by hand how to work with the material. Digitally, there were some restrictions, because the aim was to be able to physically build the rocks, so they retained a very geometric shape rather than fluid. I worked using Rhino for this process. Instead, if I would have used another program called Maya the outcome would have been much more fluid but the intent was to create the garment rock mannequins with panels so that the rock would be buildable, and to translate this back to Donna’s garment patternmaking techniques. So in the end, they were not quite mannequins, not quite garments, but represent a hybrid of the two.

AC: The link between using the 3D software modeling programs and investigating the physical materials was important to how the forms developed.

OS: The programs are enabling, as a tool. Within the programs, I could start exploring this more if I started creating scripts which could generate thousands of iterations in one go, however, for me this is not just the way I work with computers, I really use it as a tool. Using Rhino enabled me to explore possibilities because I can alter the shape very quickly. If I had to generate those ideas by hand, I would have had to re-cut the pieces in corflute every time. So this process is more efficient and more economical.

DS: And you could generate multiple outcomes from the one set of patterns. And this was really interesting to me, because, as I work manually by hand to create my patterns and garments, this really opened up a series of possibilities, that currently I didn’t have access to in terms of my skills.

AC: That’s when working with the physical material comes into play; it seems that a lot of the design development is not purely while you are sitting on a computer it might happen when we have discussions, or when you work directly with the materials. And that is common to all of us within this collaboration.

OS: The interesting process I discovered for TRANSITIONS was that working with steel, you can work really quickly to make the form. Because the process of welding is instant, even though I designed something on the computer using the 3D modeling software, in fact once it becomes physical, nothing is exactly precise, which is interesting. The model is slightly different from the one in the computer. For example, in the creation of the two sculptures that were folded on the wall, I had to add some additional pieces to support the shape. I didn’t design it this way, however, in the end, I liked the visual effect that it created, but I would never have understood that until actually working with the material. So not only through our discussions, that the process of change occurs, but it happens also through the materiality.

DS: And the process that started with CONSTRUCTIONS is really interesting to me because at the moment I do a lot of my work by hand and when you produced the digital
versions and were able to print them out onto paper, this was a process then I could integrate into my practice. And personally, working with physical paper and materials is something I really enjoy about the fashion making process. There is something quite intuitive and subtle that happens working with materials, based on my experience with them, which perhaps could be lost if only working in digital.

Our Type of Collaboration

To work collaboratively, passing the shuttle of creative vision back and forth, in a way that advances or changes the pattern, is to imagine a community in terms of affiliation, rather than filiation. It is a technique for making sense of gaps, interruptions and unpredictable crossovers. (Carter 2004: 5)

OS: We have discovered we have our own working definition of collaboration, which is different from just sharing an idea, it is more about the exchange of the processes, how one can start and the other one finishes. It makes me realize there are so many different ways to interpret collaboration.

DS: We are developing a very specific type of trans-disciplinary practice, as we have discovered, there are processes involved that engage with the element of chance and experimentation. Within collaborative practice, there might be other ways of working together, but specifically for us, due to the processes we engage with, the outcomes in a sense have each of our hands on them.

OS: It has seemed quite natural the way we have developed our collaboration, but in reflecting upon this, it is obvious that we talk a lot about it, and have developed some common ground. There is a very fluid way of communicating.

AC: It is significant that our ideas development and working practice happens when we are together for a lot of the time, and not when we are in separate studios.

DS: Yes, and that could be quite different to how other collaborators work. Often, you may collaborate on a concept, but then go away and do three separate things.

OS: I see this collaboration as something very interesting in the sense that the way we work it is more one of us starts the process and we don’t know exactly where it is going, because each of us takes it into our own way of working, and then shares it back with the others. It allows for each one of us to express ourselves creatively, yet we agree on the themes, and are lucky to have common understandings.

AC: As a testing ground the exhibitions are a reflection of where we are at, and how the collaboration works, at this point in time. The exhibitions are about our process, which is not static, as we are developing our understanding of what MAKE.SHIFT Concepts might actually be, as a trans-disciplinary collaboration.

OS: The exhibitions allow us to stop at some point and produce something that makes physical perhaps our conversations. What we have recognized so far is that there has been so much evolution in our processes, so much progress in the way we understand each other, and understand the collaboration.

AC: I think what is really exciting about how we are working together is we can bounce ideas off each other in different ways, while also responding to materials and responding to the spaces we exhibit in. And we are open to possibilities, which are totally different to what we might be doing separately.

OS: And the exhibitions enable us also to put our work in front of an audience, and reflect back on how it is being perceived. It’s clear that creatively we push each other, because individually we might not produce half of what we have done, and exhibiting in public galleries also creates deadlines. What I’m really interested in, is not just the collaborative work itself, but the potential for the unexpected deformation of the process that comes through the collaboration; identified in the way, for example, that the video from TRANSITIONS was morphed and transformed by the space.

DS: For me, this collaboration is about exploring the relationships between things, between the three of us and our separate practices. It is almost a constellation of things, which are in dynamic flux. It has enabled me to understand that the garment is not necessarily a separate object, or in a relationship only to the body, but is in a dynamic relationship to the textiles, the space, the gallery, the sculptures, our thoughts, inspirations and discussions, and can reflect all of this.

OS: What I find really interesting about the collaborative process, and the way that perhaps the installation of TRANSITIONS came together was how fluidly the creative communication seems to be evolving. At one point we reflected on the installation and realized that one of the shadow sculptures on the wall had an arm
up, and Donna had installed her garment with the sleeve up and it was exactly the same, from the entrance, it was the same line of sight.

**Figure 4**

**Figure 5**

Uncovering the Idea of Potentiality

The collaborative process can assist in the stimulations of . . . new insights and in the verification of their significance. . . . Through collaboration, practice and research processes are enriched by the introduction of ideas and sources outside the normal sphere of the individual researcher, and the collaborative process combines skills and expertise in a way that opens up opportunities for exploration otherwise closed. (Mafe & Brown 2006: 10)

AC: One of the things that I learnt from the TRANSITIONS exhibition was, no matter what our intentions were when we were planning the video, when we actually installed it in the space the form of the work suddenly became something else because the work itself has its own response to the space that we were exhibiting in. The visuals suddenly became charged with potential, because the projection was being wrapped around the corner of the walls, rather than onto a flat screen. For me, when I saw the video in the gallery space for the first time, it was really weird because that middle space where the two projections over-lapped, was almost a kind of door to another dimension. And even though by using two projections we always knew that overlap would occur, it was nice to find that you could produce something that still had that element of chance, and the unknown.

DS: It still had room to be ambiguous, and that was interesting. We could have prepared one film projection, however, by using two projections we created an opportunity for something to happen between them.

OS: The difference that we had in mind, however, was not quite the same as what happened, where we ended up with this kind of door or window when the projections were overlapped. Because the walls were white it was like we were playing with the opacity on Photoshop or something similar and I never quite visualized it like that in my head.

AC: And that was really interesting, because the way you interpret it is suddenly very different, and we see opportunities in that. There is this idea of potentiality.

DS: For me, it visualizes this idea we are working with that within our processes we are trying to embed something that we can’t predict, something that can spark a new development; something that has potential. There’s suddenly this element of surprise and how to creatively respond to that.

AC: What we also recognize, as part of the process, is that the materiality of what we are working with can influence the design at the same time. For me also, this idea of unpredictability and chance is connected to materials. I try to incorporate techniques where I don’t necessarily have full control over what’s likely to happen.
DS: And for example, the use of anamorphic projections in both exhibitions was a way to explore this.

AC: Yes, the film presentation for TRANSITIONS built on the techniques we applied in CONSTRUCTIONS where we created an anamorphic projection. Using those anamorphic techniques changes the way the video is being perceived, not only for each of us, but also for the spectators.

OS: Because the projections were wrapping into the corner of the room, the model got deformed, stretching and shrinking as she walks.

AC: In TRANSITIONS, using the anamorphic projection meant the visualization was deformed and abstracted as the model walked across the corner, and this was interesting because it abstracted the body, the patterns on the textiles and the garments as well. Suddenly there was this new range of imagery, which enabled exciting creative possibilities.

OS: Through my own process I play a lot with deformation. Particularly with the development of the timber sculpture from TRANSITIONS, the deformation process guided the final outcome, because through these techniques, I was really stretching the image and exploring the optical effect that was a little bit morphed, but enabled the final result. And, then within the space, Armando started taking photos of the works, including putting the camera on ground level and shooting almost in macro and those pictures became quite interesting actually, for me, and more about informing ideas about what we do next.

The Development of Hybrid Outcomes

Design isn’t just product, it’s also an environment . . . The process of making clothes or another form of expression altogether, like a film or a book, all add up. They become part of the design. (Broach & Kirkby in Uhlirova 2006: 410)

DS: It seems to me that, because we are working in a trans-disciplinary way, and combining insights and processes from textile design, fashion design, art and architectural practices, it’s almost like the outcomes we are producing reflect this back to us. We are embedding how we work into the objects that we produce. The outcomes can no longer only be read from the perspective of one discipline, but work across them.

AC: The outcomes are quite open-ended in a way, other people can interpret what we do in lots of different ways, and the practice is not confined to traditional conceptions of textile design, fashion design or architectural design. We are very open for the practice to be transformed into something hybrid, and to discover what the results can be from that.

DS: I see it as important that we’ve been working in series, producing a series of outcomes in combination, which have formed both exhibitions. There are all these dynamic relationships between the works that shift our understanding of them.

AC: What is an important part of what we are doing as MAKE.SHIFT Concepts is that we are producing outcomes, which continually feed our creative process. The works are not necessarily final; they are open-ended. For example, Olivier’s sculptures can be interpreted in a whole range of different ways; they could become, for example, a piece of furniture, a building, a car or a jeweler item.

DS: And then I see potential to reinterpret them back into garments.

AC: These hybrid outcomes we have produced are not necessarily classifiable as one thing or another at this stage.

DS: In terms of interpretation, they are open and suggestive. It is interesting, for example, to consider the way the garments on their own could still be interpreted as a fashion outcome, just as the prints can be interpreted as textiles. But they also have the potential to be interpreted beyond these boundaries, due to the incorporation of the spatial dimension Olivier brings and the way we bring the works together.

AC: Another element that has been really important to both exhibitions has been the use of light. Not only to the garments and the reflective and transparent fabrications, but there is also the way light is explored in relation to the use of projection, and film, and the way light then transforms the textile prints and the image in the installation.

OS: Yes, the use of light was also important to the metal wall sculptures. And the idea came really when we were doing the shooting for the film, and there was this fade in fade out, especially when the model was walking to the back and then front and we blurred the image. The blurry effect, the lights, there was something very soft when the image fades and, by contrast, metal is something strong and harsh, quite cold. So this made me think why don’t I make only half the sculpture, and let the other half be a projection.
DS: And that was really interesting in the final pieces, because again the outcomes are open-ended, and reliant on the light and the space in which they are exhibited to become complete in a sense. And that works well with the other types of outcomes we produced for TRANSITIONS. And it is also interesting for the fact that if they were exhibited in a different space, or a different wall, or the lights were cast a different way, the pieces would look entirely different because of the shadow.

OS: By physically creating only half of the sculpture, the light does the rest, and yes, it could be altered. And this has a relationship to the video, and the way that in any space it would look different, according to the way the two projections are set up and overlaid, and the type of light.

DS: And we understand that the space and the situation that we’re placing the work into, has a series of variables that gives back as well. The physicality and materiality of the space fills in part of the gap. And I think as a result of working collaboratively, as a fashion designer, this is something I am starting to understand more.

OS: And it's interesting because those two pieces ended up being the most successful ones out of the four I think because people were more attracted to them, it seemed to create more emotion I think.

Trans-disciplinary Practice: Concluding Thoughts

It was once thought that architecture, sculpture, and painting belonged together. . . .Today, it is rare to find these three arts united in any but the most tentative way. . . .Ironically, perhaps, their separation enabled them to influence each other in ways they never did before. It was not until the beginning of the 20th century that we find examples of paintings and sculptures having a direct influence on architectural design. It is as though their independence from each other gave them an intellectual and artistic parity, and allowed architects and painters (later, photographers, filmmakers, and video artists) to learn from each other’s works. (Woods 2009)

DS: It is interesting to discover more about how we work together and to relate that to how other trans-disciplinary or interdisciplinary practitioners may work collaboratively and the processes that are common but then also those that are unique to our working methods. I think we recognize the need to create a sense of transparency around the processes that we are working with, in order that we may be able to reflect on them ourselves, but also to then assist others to do the same. Practice-led research within fashion has not necessarily been articulated with much depth from a disciplinary perspective, and what I am discovering is that being part of a trans-disciplinary practice, is allowing me as a fashion practitioner to reflect and analyze more fully the processes that I work with, but then also perhaps to propose a way to work across disciplines, more broadly.

AC: Within TRANSITIONS, I think we explored a very different way of presenting fashion film, garments, textiles and sculpture, which perhaps takes it out of strict disciplinary contexts. It starts to make sense beyond fashion and beyond textiles, into art and spatial practices.

DS: For me that comes back to what we were discussing earlier in that as a collaborative trans-disciplinary practice what we’ve ended up with is more than where we each individually started. It’s more than just a fashion outcome, or a textile outcome or an architectural outcome, but representative of a hybrid combination.

AC: I think since doing more work together and doing work as MAKE.SHIFT Concepts it’s become more than any of our individual interests as practitioners. As three people producing creative outcomes together, we are not necessarily all concerned with one specific thing, except actually the process of working together. Understanding how to work across our disciplinary areas, and developing an articulation of this approach to our practice when it is combined has been important so far, and something it will be interesting to see develop further.

REFERENCES


