EXPLORING THE RELEVANCE OF

MANUAL PATTERN CUTTING SKILLS

IN A TECHNOLOGICAL ENVIRONMENT

BY

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ABSTRACT

Are students losing the ability to visualise and instead 'allowing the computer to do it'? Today there is a requirement for pattern cutters entering the garment industry to use the computerised pattern design system that makes the transporting of patterns to overseas factories quick. Whilst a computer screen can display visual images representing digitised data, this is possibly at the cost of the professional or trainee losing the skill to visualise, an absolute necessity when required to construct a three dimensional design that is illustrated in two dimensions.

The aim of this thesis is to look at the relationship between creative manual practice and computerised technology when creating a garment pattern. Through practical studies and background knowledge the advantages and disadvantages of traditional and modern methods are investigated together with what is gained or lost when substituting tactile processes with the computer screen. By personal application it was experienced and documented how to use computer digitisation to create garment patterns.

The findings from practical studies to explore the skill of interpretation led to further questions and went on to reveal how important training is as well as the capabilities of an individual. From this outcome the need for change in fashion design courses is suggested with regard to greater training time. Computerised pattern design systems are an essential tool to enhance advances in the garment industry, but this research shows it is imperative that a future generation, in a world of fast paced technology, learn from skilled manual workers in order to maintain a high standard of technical knowledge.

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DECLARATION

I declare that this thesis is my own work. It is being submitted for the degree of MA by research at the University of Bedfordshire.

It has not been submitted before for any degree or examination in any other University.

Name of candidate: Date:

Signature:

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BIOGRAPHICAL NOTES

After completing a Diploma in Fashion Design in 1975 I was employed in London as a trainee embroidery designer. In 1978 I was a trainee pattern cutter with a fast growing fashion design company, which remains one of the leading high street fashion companies today. My experience of working in the clothing industry involved working as a toilist, head pattern cutter and grader and overseer of patterns for production liaising with manufacturers. I taught pattern cutting at the London College of Fashion and later in my career worked as a freelance pattern cutter and stack grader for various fashion companies working with designs for lingerie to casual outer wear. For the past six years I have been a Fashion Technician at the University of Bedfordshire where I teach and guide pattern cutting and clothing construction.

LITERATURE REVIEW

There seems to be little written on the comparisons between creating a garment pattern manually and creating a garment pattern using computerised technology. There is literature explaining how to cut garment patterns describing different methods and literature on how to use and get the best from various computer Pattern Design Systems (PDS), however what this research aims to explore is what may have been lost or gained by using computer technology when making patterns and whether or not manual pattern cutting skills are relevant in a technological environment. The approach therefore towards this research subject used reflections and insights from the researcher's professional background together with investigations carried out through personal interactions and observations; these were supported by literature concerned with craftsmanship, pattern history, new technologies for the garment industry and generic pattern cutting in order to support practical studies and discussions.

In her published paper Schenk (2005) shows that in the twenty first century there are still concerns that students' drawing ability is insufficient to equip them for a career in design, and that traditional paper-based design still plays a significant part in idea development. Likewise when working with traditional paper patterns there is an advantage in developing and discovering new ideas on paper whilst simultaneously manipulating fabric, enhancing the process of visualising a design that will become a reality. The ability to visualise requires the development of skills and knowledge and to know *how to make possible* an end product as well as to image it in the mind's eye. For a practitioner this often will involve tacit knowledge sometimes referred to as 'know how' (Brown & Duguid, 1998) meaning that knowledge which is difficult to write down or verbalise and is largely learnt through experience and observation.

Frost (2010) also describes tacit knowledge as that which refers to intuitive, hard to define knowledge and largely experience based, stating that virtually all practitioners rely on this type of knowledge. Dormer (1997) similarly says that

just to assume one knows something well enough to write about it does not necessarily mean one can do it. These are issues that this research investigates and because of the nature of the subject was best explored through practical studies.

Sennett (2009) when discussing working manually and working with digitisation highlights the importance of what he calls 'circular metamorphosis', the repetition of doing something, redoing it and redoing it again, tedious though this may seem Sennett argues that this redoing enables an understanding of a process or a result. He also states that plotted points on-screen, the algorithms, can indicate that the computer knows the results but questions does the operator understand the results. This learning-through-repetition argument is supported with a written account of the researcher's personal experience of manual pattern cutting training in Chapter 1 1:3. For the researcher as a practitioner and technician working in education this raised the question, 'Do students know why they have done what they have done? when working on the PDS, if manual skills are not learnt.

When discussing the use of technology such as the Gerber Pattern Design System (PDS) to create garment patterns for mass production it became relevant to the research to ask whether because of the use of hand skills, manual pattern cutting was a craft and was pattern making still a craft if patterns were produced using digitisation?

Dormer would argue that the PDS operator is no longer a craftsperson because 'to claim that one processes a craft is to claim that one has autonomy in a field of knowledge' (1997, p.102). The craftsperson, in this case the pattern cutter, losses their autonomy when the manual process of interpreting a 2D design into a 3D garment is diffused into the algorithms of a PDS required for manufacture. 'There is a debate, among sociologists regarding how far technology shapes us and how much we shape technology' (Dormer 1997, p.7), indeed this is also applicable to garment designs for manufacture when discussing the use of the

flat-screen and ready-made determinants rather than the more intuitive, tactile method of manual skills. How much do garment designers design to fit the computer approach or does the computer determine what is designed? By bringing together these two arguments it could be said that using computer technology can

a) Hinder the operator fully understanding *why* they have done something

b) Shape the operator in their creative decisions by the algorithms of the technology

And therefore it could be debated that producing a garment pattern on the PDS is preventing autonomous creativity and fully understanding the consequences of why an action has been taken in order to produce a particular affect.

Running simultaneously with personal research, *Drapers* the fashion business journal launched a campaign called Save Our Skills (SOS). Discussions about the concerns for future British manufacture were documented quoting Directors, Chairpersons, Senior Technologists and Heads of fashion courses. A fundamental point of discussion was whether students are equipped with the understanding of clothing construction when they leave higher education/university, together with leading industry figures underscoring the desperate need for the increase in training for key construction skills. Interestingly a noted comment stressed the importance of understanding the *craft* of construction and when interviewing senior pattern cutters for SOS in the *Drapers*, professionals described pattern cutting as a craft, including not only hand drawing ability but maths and paying attention to detail. 'Within design-led companies the pattern cutter is seen as an expertly skilled individual' (*Drapers*, 29th July 2011 p.95) this is perhaps a subjective statement but this research explores whether or not the particular 'craft' of pattern cutting when produced manually is a different experience from that of using the PDS and whether expertise is lost.

The SOS campaign also discussed the unreality of expecting the government to step in and help British clothing manufacture and the need to focus on education and skills training in schools in order to encourage technical skills alongside design. To make changes to training will take time, investment and support from a working team, something which was affirmed when assessing the conclusion of the practical studies carried out.

Before I began this research journey I was of the mind that computers could not produce a garment pattern as well as a manually skilled person could. At the conclusion of this thesis I have a new respect for computerisation in regard to creating garment patterns and the advantages it offers the garment industry. I add myself to Schenk's description of an observation she recorded in 2005

> 'The view of educators to the introduction of computers have proved to be flexible, with several describing a shift in their attitudes over the period in question from an initial reluctance to compromise the traditional hand skills (drawing) of creative design work to encouraging students to involve the use of computers (Schenk 2005).'

My concerns remain as to how standards, skills and 'know how' will be maintained in the future for individuals wanting to enter the garment industry as practitioners. The pressures of time, resource constraints, lack of in-house training and the lack of opportunities for older knowledgeable practitioners to pass on their skills are limiting, this research highlights the need for change so that equal sufficient time can be given to the technology and the craft.

METHODOLOGY

Due to the interplay between the author of this thesis as a researcher and as a practitioner the primary methodology for this research is practice-led. Nimkulat (2007) states that, the two roles of researcher and practitioner are equally important when practice-led. Practice-led research is generally associated with the creative arts; garment pattern cutting is creative and also requires cognitive knowledge of measurement and principles. Because the research subject involves individual participants in a practical exercise where patterns are to be produced from a two dimensional design the research process evolves and is not absolute.

In the context of the theoretical understandings of a practice Smith and Dean argue;

> 'Practice can be understood primarily as the knowledge, tacit or otherwise, of how something is done within the context of a professional and cultural framework' (2009 p.214).

Nimkulat (2007) also suggests that practice-led research is not about carrying out research in order to produce artefacts but it is rather a conscious exploration into the chosen topic involving the knowledge in the production of artefacts, as it is with this particular research.

Object-based research is often adopted by those researching clothes as tangible objects, investigating silhouettes, construction and sewing techniques (Kawamura 2011), this was an option as the garments and patterns produced are a means of gathering data; However, key to this research is the process of producing the pattern for a garment with emphasis placed on the importance of abilities and techniques when working in a technological environment and not so much upon the history of the artefact. Conducting practical exercises to better understand comparative ways of working in the present and future is an integral

part of this investigation and Kawamura suggests, object-based research is not meant for practitioners in the fashion business (2011 p.2).

Practice-led research is appropriate as it relies not only on explicit knowledge to gather information but also tacit knowledge, that which is usually associated with vocational training and skill (Niedderer 2007), this said the research evolved to became eclectic whilst remaining within the discipline of practice-led because of the multiple methods used to produce results. Smith and Dean (2011) use the word repurposing when using techniques familiar with a practice to serve as a research method so both the practice and the work meet the requirements of a research process requiring outcomes.

This research was originally inspired through the practical experience of the researcher as a manual pattern cutter and although the personal experiences of the researcher have been directly relevant to the research subject, the patterns and garments produced were the work of others. The researcher was however an active participant as designer and as a trainee learning to use the computerised Gerber Pattern Design System (PDS).

Information for analysis was gathered in the form of informal interviews, a questionnaire, artefacts such as patterns and garments and personal notes taken by the researcher when using the PDS

- Informal, open-ended interviews were conducted to witness narratives, opinions and different experiences and views when creating patterns. These conversations took place face to face and over the telephone. Quotes from participants as personal communications have been embedded within the thesis and anonymity has been kept throughout to maintain confidentiality.

- The questionnaire was distributed with identical questions to enable more objective information to be collected. The questions

focused on allowing others in the garment industry to describe the role of the pattern cutter/maker highlighting gains, losses and changes that have occurred due to computerisation.

- Patterns, both manual and computerised were produced from an identical design sketch. The researcher took the role as designer; this is explained in Chapter Two 2:1 Practical Study 1. Four individual pattern cutters/makers were involved in this practical exercise. Data in the form of measurements, aesthetic interpretation, construction and fit was collated from the individual patterns and garments in order for comparisons to be documented.

- A lived experience, the phenomenological was adopted when the researcher became a trainee learning new technology skills using the digitised Pattern Design System (PDS). This activity was recorded in the form of personal notes and through observation. A second practical study was conducted as a result from this experience which involved creating dress patterns and toiles from an identical sketch. This second study is explained in Chapter Two 2:2 Practical Study 2.

The practical studies took place in order to be able to investigate the interpretation of a garment design into a two dimensional (2D) pattern. The purpose of this exercise was to explore the similarities and differences between manual skills and technological skills when producing garment patterns. Data was gathered from the 2D patterns and the garments made from the patterns through a number of fixed measurements. This data alone was insufficient in demonstrating the interpretation of a 2D sketch into a reality and qualitative data was required. When analysing the patterns and the garments, data relied

upon professional judgement from the researcher as the designer in regard to the interpretation of silhouette and proportion. Comfort and fit in the garments was recorded when the garments were tried on. These results led to further investigation asking what may have caused the diversities between the garment patterns as it appeared that the results were not reliant upon method and techniques alone but also human factors.

Due to little research having been documented on the comparisons between manual and technological pattern producing methods qualitative data provided a more explorative method of gathering information, allowing for new understandings to evolve as the research progressed. Throughout the research there were reflections, discussions and considered insights creating more information to draw further insights and so on and so forth until complete. During the journey of this research results produced along the way determined the next action to take and this became evident when the personal application of the researcher's manual skills to the PDS meant alternative action needed to be taken to execute an experimental exercise other than an initial idea.

The purpose of this research has been to achieve a piece of writing that will contribute to the relevance of maintaining the knowledge of manual skills in the future for training and educating those entering an environment of continually developing technology.

All the research that is computer based in this thesis refers to Gerber Technologies AccuMark software specifically designed for pattern-making, grading and marker-making.

INTRODUCTION

How can hand skills be maintained in a world of technology in the twenty first century? This question is one that I will attempt to answer in this thesis which considers traditional and creative manual skills in garment pattern cutting and how these can be integrated with new technologies in garment pattern design systems.

The inspiration for this research was initially sparked by listening to and observing under-graduate students studying Fashion Design at the University of Bedfordshire where I am at present a Fashion Technician. The students expressed a desire not only to learn and apply hand skills such as pattern cutting and sewing to their fashion projects, but to also master other relevant hand skills such as knitting and crochet which they could use in their fashion designs. However, the students during their studies are required to learn digitised technology skills using Computer Aided Design and Pattern Design System software (CAD and PDS) and this combination of hand skills and technological skills requires both traditional and modern techniques. Applying both these approaches to the students' final projects raises the issue of the importance of maintaining manual skills and how possible this is in today's environment of continually advancing technology.

The research will explore the advantages and disadvantages of computerised pattern making in the clothing industry and how manual pattern cutting skills help to inform a digitised future. What is lost and what is gained in the process of computerised pattern making will also be discussed.

It is important that I draw attention to my use of language. Throughout the research I refer to manual pattern *cutting* and computerised pattern *making.* The reason for this is the distinction between manual work and computerised. An integral part of manual pattern cutting is the cutting out of the pattern pieces whether in paper or cardboard, whereas computerised pattern making is the

pattern on screen but not cut out. If the computerised pattern pieces are to be cut out this is done by another piece of machinery called a plotter. The pattern pieces are programmed to the plotter, translated to full size and drawn out, they are then either cut out or perforated by an automated knife or left uncut.

To date there is little published research on this topic but despite problems in attaining documentation, I believe it merits investigation because an understanding of the impact computerisation has had on pattern creation is important for future standards of manufacture. I draw this conclusion from my experiences of working with fashion students, personal communication with colleagues in the clothing industry and observations of retail fashion on the high street. Throughout the writing of this thesis, I have found it exceedingly difficult to put into words what exactly the difference is between working on patterns that are full scale that I can feel and touch and those that are sized down and displayed on a flat screen. However, I have endeavoured to bring together not only theoretical insights but also my own personal experiences to illustrate the creativity of pattern construction.

From personal experience maintaining traditional skills of flat pattern cutting and draping together with practical experience in the industry will ensure an understanding of why and how fabric reacts and behaves the way it does and what the influence of the drape of the fabric, characteristics of the fabric, fit, comfort and style have on the construction of the pattern. The subject of bringing clothing manufacture and manufacturing skills back to the UK has been well documented recently and recognised and debated in the House of Lords (Sugar, 2011), when exploring what changes need to take place in order to inform and train individuals to a standard of construction that involves a broader range of creative skills. Knowledge of manual skills in garment pattern cutting and in garment construction is fundamental in a fast growing technological environment if the digitisation process is not to be hindered by the limitation of technological knowledge only.

Outline of thesis structure

In chapter one of this thesis I give some information on the history of garment patterns and their construction as background for the reader, followed by a description on different pattern cutting techniques and the training required over a number of years written from my personal experience. In chapter two, two practice-led studies are conducted and documented the data analysed and outcomes considered. Chapter three discusses the term *craft* and summarises answers from a questionnaire. The final chapter draws conclusions from the research and considers what the future might hold for pattern design, training and clothing manufacture.

CHAPTER 1:   BACKGROUND

1:1 DRESSMAKING TO MASS PRODUCTION

Before patterns were created sewing existed for thousands of years. It is the craft of attaching one object, not necessary cloth, to another by using stitches made with a needle and thread. Clothing, together with shelter, warmth and food are basic needs for survival and early archaeological finds show that our ancestors would have clothed themselves in the skin and fur of animals and held separate pieces together by 'sewing', using needles made out of bone or antler and thread from sinew and catgut. With the invention of weaving and the further invention of a weaving loom in 1801 by Joseph Jacquard that created complex patterns (Benson 1983), all this changed and woven and knitted cloth as we know it today is the main source from which garments are made. (It is interesting to note at this point, that in July 2000 the BBC science editor David Whitehouse reported that Professor Olga Soffer, of the University of Illinois, was to publish her findings regarding woven clothing that had been produced on looms 27,000 years ago, far earlier than previously thought (Soffer 2000).

The everyday woman's first introduction to the paper pattern for a garment she wished to sew began through magazines and mail order. In the 1840's full-sized pattern shapes would be added as a supplement of a woman's fashion journal. The patterns were illustrated on 'pattern sheets' with each pattern piece to a garment drawn on the sheet of paper. These pieces would overlap each other which meant the user would need to copy off each piece following the pattern shape carefully, discerning it from other pieces, before being able to cut the pattern piece with the cloth to make up the garment (Seligman, 2003).

This is still one way that patterns are distributed today. As an example, *'Drape Drape'* (2012) by Hisako Sato, a Japanese designer and pattern cutter, includes at the end of her book a pocket that contains two paper sheets with numerous pattern pieces on them covering seventeen garment designs. Each piece needs

to be discerned and copied off before it is available to be used to make up the garment. I have been able to use my new technology skills mastered since the beginning of this research to digitise the shapes into the Gerber Pattern Design System. This also means the pattern pieces are stored on the computer and readily available for students to use if required.

> 'In 1863 patterns existed for women to use as a guide and were given in a general size but the patterns would need altering to fit appropriately. The sewer had to grade (enlarge or reduce) the pattern to the size needed' (Butterick, 2012).

An American tailor Ebenezer Butterick (1826–1903) in the mid nineteenth century experimented with creating different size patterns, inventing the 'grading' of patterns.

> 'Mr Butterick was much annoyed by the waste of time in cutting children's garments, and conceived the idea that a set of graded patterns would be a great advantage to him and other tailors and especially to mothers making clothes for their own children' (Bicknell, 1907 p.300).

In 1863 Butterick set about the making of patterns as a new business by creating cardboard templates of all the different sizes and these were the graded patterns; these soon became produced on tissue paper so the different size patterns could be folded easily, packaged and distributed by mail (Butterick, 2012).

Up until the time when patterns were produced in this way, women would have undone the sewing of a garment already made and from that garment produced other garments (Kortsh 2009, p.8). This is also a method used today in the clothing industry as one way of producing an initial pattern; it is referred to as 'modifying' (Davis Burns & Bryant, 2007).

At the time paper patterns were becoming popular for general use in the mid-1800s the patent of the lockstitch sewing machine was registered by Elias Howe and Isaac Singer respectively eventually leading to popular use of the domestic sewing machine (Head, 2004).

In 1858 British born dressmaker Charles Fredrick Worth opened his fashion house in Paris where excellently made and finely sewn dresses for the individual became established and known as 'Haute Couture' (Wilcox, 2007). This too had an influence on the paper pattern industry. Evolving from Vogue magazine which covered the couture collections, by mid-1920 the Vogue Pattern business had its own publication and in 1949 originals from the Paris couture had been duplicated in pattern form and ready to wear (Butterick, 2012).

> 'It was not until the 1920's when fabric and cut of high fashion became simplified, that the styles of couture became widely available to the mass market in the form of ready to wear dress' (De la Haye, 1993 p.39).

The paper pattern industry was a flourishing and prosperous business by the year 1923 with tailoring and dressmaking in England being widely read about in women's magazines, influenced by the French Parisian magazines that featured descriptions and plates of women's fashions (Seligman, 2003). Butterick, now the leading producer of commercial patterns, eventually bought Vogue and McCall's and became the largest pattern producing company in the world. In 1948 Butterick purchased advanced printing equipment including two new presses that printed markings on the tissue pattern paper.

> 'The printed pattern was the most significant improvement of home sewing patterns since its invention. What a joy it was for the home sewer to have bold dots, notches and lines replacing the little holes that previously marked darts, matching points and fold lines!' (Butterick, 2012).

Home dressmaking continued growing due to the availability of paper patterns, ready-made clothes and the convenience of the domestic sewing machine. Ready-made clothes were available yet limited in demand in the 1840's and restricted to the demand of the middle-class woman, not the mass market (Cumming et al, 2010, p.170). However ready-made garments had already been available in supplying the military with uniforms using identical design garments (Godley, 1997), and many contract orders for identical military uniforms had been generated in the French wars as early as 1793-1815 (Sharpe, 1995 p203). Ready-to-wear manufacture for the civilian steadily began to grow during the period between the two World Wars and the counter reaction to factory production gradually taking over clothing production meant that dressmaking, tailoring and hand techniques that once dominated now started to decline (Boydell, 2010). The contrast in the prices of garments was noticeable.

> 'Handmade custom-fitted clothes are available from tailors and dressmakers, but production is labour intensive and time consuming. The process of manually measuring, patternmaking, fitting and constructing single garments results in high costs' (Voellinger Griffey & Ashdown, 2006 p.112)

Wartime regulation on mass-produced clothing was significant partly because of the limited number of garments available but also because women looked for durability and quality. This impacted the industry as it emerged from the war with better production techniques and more effective costing and sizing practices. This resulted in manufacturers being more efficient and prosperous (Boydell, 2010). Cheaper fabrics were used for mass production, for example silk substituted with rayon, which helped to create cheaper garments and enabled the majority of working people to afford ready-made clothes. Women who had traditionally sewn their own clothes would choose to purchase styles ready-made (De La Haye, 1993). One effect the introduction of commercial patterns and the manufacture of ready-to-wear garments had was less individuality

because of the standardisation in size and choice. There remained however the customer who preferred a garment with individual fit and style and it was the smaller producer who was able to do this:

> 'The small retailer could quickly respond to changes in demand and was always in touch with customer taste. Small scale meant flexibility and many shops were in a position to order a garment made in a smaller size or different colour if required' (De La Haye, 1993 p.43)

De La Haye refers to retail in the mid-1920s, yet in 2012 this is still the case that the smaller producer, dressmaker or bespoke tailor is able to personalise a garment for an individual, but for the average working customer this is too expensive due to the time and skills involved.

Bespoke infers that personal measurements are taken and the cloth is chosen by the customer. Master Cutters on Savile Row, London add

> 'to meet with traditional trade definition of 'bespoke', a garment must also be made according to a pattern created and cut uniquely for that customer, be assembled by hand with machines used only for long seams and befitted on the customer an indefinite number of times from baste to finish that the most successful and individualised fit can be achieved' (Anderson, 2009 p.258).

Unfortunately the word bespoke in its widest sense can purely mean made-to-measure and is synonymous with made-to-order, meaning a suit can qualify as bespoke if nothing more than the buttons have been personally chosen by the customer (Anderson, 2009).

Haute Couture is the French equivalent to bespoke. Translated 'high fashion/dressmaking' (Collins, 2003) it is traditionally a handcraft industry with in-house workshops, creating individual and personalised garments with

embellishment on the most exquisite cloth. To maintain its high quality, today it is regulated by the Chambre Syndicale de la Couture Parisienne (Wilcox, 2007).

The majority of people require clothing at a reasonable price and this is made possible by the manufacturing of identical ready-to-wear garments. With the advancement of new twenty first century technologies a procedure called Mass Customisation has developed involving 3D body scanning. Mass customisation as opposed to mass production endeavours to bring ready-made and bespoke together, Tseng and Jiao (2001, p.685) define mass customisation as 'producing goods and services to meet individual customer's needs with near mass production efficiency'. Therefore mass indicates a garment design intended for large quantities still yet combined with customisation indicates that personal measurements and requirements can be applied for an individual.

> 'It is a step toward providing customised apparel that accurately reflects an individual's body shape providing a more 'personal' garment without paying bespoke prices' (Voellinger Griffey & Ashdown, 2006 p.119).

Standardisation of sizes introduced in 1951 made it easier to access a pattern closest to requirements, either for a commercial pattern for the home dressmaker or for the production of ready-to-wear. Pattern cutting became a recognised profession and patterns were produced by professionally trained pattern cutters and graded by hand into different sizes. With patterns made into different sizes it became easy for factories to mass produce clothing for everyone. It was the introduction of computer pattern making developed for use in the apparel industry in the early 1980s that took much of the UK's garment manufacturing overseas (Davis Burns & Bryant, 2007). One of the problems that manufacturing overseas brought was that the distance between the product being made and the place of retail created a longer time lag between the two and time is important to meet the demands of the consumer (Godley, 1997). With the introduction of the computerised pattern design systems, patterns

could be send instantly to a factory on the other side of the world enhancing the management of time enormously.

> 'Computers have been used by apparel companies since the early 1980's. PDS systems are capable of storing an incredible amount of data that can be quickly tweaked and refilled. There are many benefits to PDS - speed, accuracy and ease of data transmission being some of the obvious' (Anderson, 2005 p.2).

The above statement concentrates on the administrative and logistical elements of the pattern. The objective of this research is to look further into the creative element of producing a pattern and what has been lost and what has been gained when transferring the traditional and creative craft of pattern cutting into a computerised format.

HOME FASHIONS
PAPER PATTERNS

1937

51,805
PRICE - 1/-
OVERSEAS 1/9

MATERIAL REQUIRED

SPECIAL NOTE.—

TURNINGS

CUTTING YOUR MATERIAL

HOW YOU MAKE IT UP

A WASHING FROCK

SELVEDGES

SLEEVES

FOLD   FOLD

SKIRT   SKIRT FRONT   FRONT   BACK
SIDE PIECE
                SELVEDGES

                SKIRT BACK

SELVEDGES   FOLD   SELVS OF 36 IN. MAT.

Pattern Address: 291a, Oxford Street, London, W.1

Researcher's own pattern. Original 1937 housecoat, all the
instructions can be seen on the front of the envelope.

8

1:2 TECHNIQUES OF PATTERN CUTTING/MAKING

Below is a list of key skills of a manual pattern cutter;

- The ability to visualise

- Technical accuracy

- A creative ability

- A critical eye

- Able to apply mathematical skills

- The ability to draw

- The necessity to have an eye for balance and proportion

- An 'engineering' aptitude

- To be able to pay attention to detail

- To have sensitivity to fabric characteristics

- To possess a natural curiosity of construction

- Not to be afraid to get it wrong and develop further

(Adapted by researcher from Creative Skillset, 2012 and Connextions, 2012)

The fundamental function of a pattern cutter is to have the ability to convert a 2D design of a garment into a 3D reality. This involves the skill of visualisation and interpretation. There are certainly techniques to pattern cutting as the list illustrates and a number of the skills can be learnt on a specialised course or by doing an apprenticeship. The above list indicates that pattern cutting requires cognitive knowledge such as logical thought in the fundamental principles and mathematical ability in the use of measurements and calculations. I argue that it requires more than this; it demands a use of the senses, particularly sight and touch and it requires the ability to be creative, in my opinion this combination makes it an art and a science. A pattern cutter never stops learning: there are as many different patterns to be cut as there are designs imagined. I agree with Fischer (2009) when she describes pattern cutting as a fascinating process

because learning never stops and that even after twenty years pattern cutters can still learn something new.

My own experience has taught me that fundamental to being a pattern cutter is the tactile element that involves working with shape, texture, 3D form and the manipulation of fabric. Pattern cutting requires both explicit knowledge and tacit knowledge. The explicit knowledge of pattern cutting can be learnt by reading and theorising and can be taught through principles and techniques and copying. Tacit knowledge is not so easily transferred because it is difficult to theorise.

> 'One of the ways of transferring tacit knowledge is by watching other people, that is, by experience and sharing. On-the-job mentoring gets to see the consequences, context and purpose of an action being done' (Rogers, 2012).

Hand skills are learnt through practice, repeating and observing demonstrations in order to gather information and to make sense of the process. An example of gaining tacit knowledge is given in the first paragraph of 'A Pattern Cutter's Profession Described' in Chapter One 1:3 page 17, where the researcher explains how she observed and asked questions in order to learn and understand.

Traditionally pattern cutters work closely with the designer "the pattern cutter is the one who would take the idea illustrated on paper and create it as an actual garment" (Pattern Cutter, female, late forties, from London, personal communications, 2011). This creates an important and exclusive relationship between designer and pattern cutter encouraging accurate translation of an idea into a physical garment.

Manual pattern cutting can be approached using three main methods; Flat pattern cutting, Draping or Modifying (also referred to as reverse engineering).

These methods are described below from what my experience as a pattern cutter has taught me.

METHOD 1: FLAT PATTERN CUTTING

The pattern cutter creates a new design by working two dimensionally. This can be by using body measurements or by using a standard template referred to as a block or base pattern. The block is a basic shape with no seams added that fits a standard sample size. When there are no seams on a pattern piece it is called nett. The standard size used to sample garment designs depends on each company's preference. The pattern cutter will work with the pattern flat on the table top, making alterations to the basic block shape according to the design sketch. It is important that the pattern cutter is familiar with the cloth in which the design is to be made as this will determine how the pattern needs to be cut to create the correct fit. Design lines and details are considered and indicated together with any design features. This is called a draft pattern as very often when working flat a pattern needs to be cut and folded and drawn on to achieve the correct fit and style lines. This initial draft pattern will need to be traced around in order to create a correct pattern completed with seams from which a first garment sample can be cut and made. All seam allowances are added at the final stage according to the cloth type and the function of the seam. Once the prototype sample has been assembled it is checked for fit and proportions. If alterations are needed these are noted and the pattern cutter will amend the pattern pieces accordingly. Sometimes, due to design or construction complications or to check proportions and fit, a whole or part toile will be made before making a prototype in the actual cloth.

METHOD 2: DRAPING

Draping requires working on a dressmaker's stand/mannequin and is also referred to as toiling. The word toile originated in France and is a noun meaning linen or cotton. It has since become a word used in the clothing industry when describing a mock-up or try-out garment (Sorger & Udale, 2006). The mannequin will be the standard size for the company's showroom samples, the same as a block pattern is. The cloth used for draping on the mannequin needs to be of similar characteristic and weight as the cloth intended for the finished garment. Cloth such as cotton muslin or calico is often used as it is cheap and comes in various weights, however if these cloths behave differently to the actual design cloth a more appropriate cloth needs to be used. It would be inappropriate to use a woven cloth if the design is to be sold in jersey fabric. Draping is usually in a light coloured cloth so design details and any markings the toilist makes can be clearly seen. To drape, cloth is manipulated around the mannequin by being moulded, cut and pinned. An understanding of the grain of the fabric and how this can affect the reaction of the drape together with the technical ability to make sure the construction of the garment is possible is fundamental to the process (as for flat pattern cutting). When producing a toile it is not necessary for fastenings, linings or facings to be attached as the toile is primarily created to test fit and proportion. Once the fit, silhouette and proportions have been accepted by the designer the toile is ready to be cut along the seam lines so each separate piece lies flat. From this a 2D pattern will be made by accurately drawing or raddling around the cloth pieces and adding the appropriate seam allowances. Markings must be clear on the toile so they can be accurately transferred on to the pattern. The pattern is then ready for a first garment sample to be made to check the suitability of cloth, design and fit.

METHOD 3: MODIFYING

This perhaps is the quickest way of creating a new pattern for a new design. To modify a pattern for a new design an appropriate existing pattern needs to be selected that is similar in silhouette to what is required. The amount of alteration or modification that is needed depends on the details of the new design sketch. Modifying can also be taken from an existing garment as opposed to an existing pattern. The garment will be carefully copied and accurately measured to be recreated before modifications are made. This way of working may not require as many pattern cutting skills but knowledge of how a garment is constructed and an understanding of key measurement points on the body is necessary because fundamental principles still apply for the garment to fit well and hang well. It is important to recognise not only the design details that need to be modified but whether or not the original garment needs to be rebalanced to create a better fit or adjusted if being applied to a different fabric.

COMPUTER PATTERN MAKING

When using a Computerised Pattern Design System (PDS) to create new patterns there is still the requirement to work from a selection of block or silhouette shapes of a standard size that are digitised into the system. The patternmaker uses these pattern shapes to make new designs by modifying them accordingly. The already digitised pattern shapes are brought up from a data base to appear on the computer screen. The correct and appropriate functions are then applied in order to modify the existing pattern pieces and to interpret the new design correctly. Not only does the pattern maker need knowledge of what technical applications need to be used to create a new pattern but they also must understand how, why and at what stage these actions need to be taken. An understanding of using technology skills is essential as these enable the pattern maker to easily access and operate the different functions available and to change or create new pattern pieces. When the pattern pieces have been made

on the screen they are stored in the system until needed or sent electronically to another PDS. Alternatively a sample of the design can be made and the fit and details checked. The PDS is linked to a plotter, which is where the pattern pieces are translated into full scale and electronically drawn onto paper and cut out.

Computerised pattern making is continually developing. With the advancement of three dimensional technologies there is the ability to move from the flat pattern shape to a design image onto a digitised figure where one is able to see how the garment shape will look when draped on a body form.

> 'when using 3D for patternmaking, a designer can drape garments over a digital image, rotate them, zoom in and visualise how the piece will look' (Davis Burns & Bryant, 2007 p.269).

The method used by the pattern cutter/maker is an individual choice as to their preference and their experience. Regardless of method, based on my professional experience, there are three fundamental categories of knowledge and expertise the pattern cutter/maker needs in order to interpret a design

- Ability to visualise so the designer's sketch can be translated into a pattern
- Knowledge of garment construction, cloth characteristics and production operations
- Awareness of body proportions and the importance of body measurements and fit

1:3 MANUAL SKILLS EXPLAINED FROM PERSONAL EXPERIENCE

In Matthew Crawford's book *The Case for Working with your Hands* he writes that in 2006 the Wall Street Journal wondered whether "skilled (manual) labour is becoming one of the few sure paths to a good living" (Crawford, 2009 p.3). Matthew Crawford himself is a motorcycle mechanic, a manual worker as well as a philosopher and educationalist. He goes on to write how he finds manual work more engaging intellectually than what is recognised as 'knowledge work' or 'explicit knowledge'. As a practitioner I understand this viewpoint because as a manual worker I have experienced job satisfaction by integrating tacit knowledge, logic and imagination with practical and tactile processes.

In this chapter I describe my personal experience as a pattern cutter to help the reader understand the importance and purpose of a pattern cutter's role in a period of time when designing and manufacturing was prosperous in the UK and pattern cutters were an integral part of the industry. The chapter presents a written account of how the profession was taught and the skills that were expected and required.

TWO INTRODUCTORY ILLUSTRATIONS

1) A man who owns and manages a large Computerised Pattern Cutting and Grading Service told me ''we have fourteen staff members in the company some of which work from home, only one is a pattern cutter. We really concentrate on grading as pattern cutting doesn't pay'' (Anonymous Company Director, personal communication, 6 October 2011). This is a different picture from thirty five years ago when I joined a thriving fashion house as their sixth pattern cutter and left that company four years later when there were eighteen pattern cutters. The company director went on to explain that some of the patterns he receives for grading purposes are "terrible, thrown together, the pieces don't match" adding ''often the most expensive selling garments have the worst patterns. The skill is with the machinist producing a well-made garment, taking their time to put the

garment together, whereas, if it is for a large supermarket chain and the garments are on a mass production line, they are run off quickly, no changes, so the pattern needs to be made better''.

2)   When visiting an experienced computerised pattern maker who uses the Gerber Pattern Design System (PDS) she told how she had recently been asked by one of the largest supermarket stores in the UK to amend some patterns to a nightwear collection due to their ill fit and bad balance (Gerber Pattern Maker, female, mid-forties, from Hertfordshire UK, personal communication, 2 February 2012). The patterns had been created in China at the factory that manufactures for this particular store. The pattern shapes were technically incorrect. She further explained to me that the pattern cutters/makers in China do not have the technical understanding and skills required to create patterns that are acceptable. Having visited the factories herself she gave these reasons

- The garments are being produced and patterns cut by a different culture to the one where they are to be commercially sold and what is required is not understood.

- The general body form (in this instance, of the average Chinese woman) is a different shape and proportion than a Caucasian woman.

- There is a lack of training in the skills needed.

- There is a lack of liaison between the pattern maker and sample maker, hindered further by a fitting not taking place until the sample garment reaches the UK.

When compared to the amount of in-house training that would have been received in the UK clothing industry before manufacturing went overseas in the early 1980s, with the lack of in-house training presently available it is understandable that these situations occur.

A PATTERN CUTTER'S PROFESSION DESCRIBED: UNDERSTANDING THE SKILLS OF A MANUAL PATTERN CUTTER

My position began not as an apprentice but as an employed trainee pattern cutter receiving a salary. Perhaps this is a reflection of an era when established staff were able to give time to younger members and train them in-house. I describe a period of time that took place before mass production went overseas. I spent my lunch hours watching the tailor downstairs, watching the sample machinists, asking questions and the employees making time to explain what they were doing. I would observe the pressers; men working on large, flatbed vacuum steam pressers pressing soft tailored jackets and suits. I observed the skilled fabric cutters cut through up to one hundred layers of fabric and I would watch as they made the lay-marker containing various sizes of one design. The lay-marker maker slots pattern pieces together like a jig-saw to obtain the tightest costing possible. The opportunity to learn was constant.

I spent the first month drawing around cardboard pattern shapes, replicating them so there were two or more sets the same. I then cut the shapes out. To draw around a pattern piece an appropriate pencil is required; not too soft as the line would add 2mm around the perimeter of the pattern increasing the size of the width and length resulting in a wrong fit. A pencil too hard left an indent or a mark not clear and mistakes would be made. Using biro or felt tip is messy and inaccurate.

Because the pattern pieces would be handled a number of times it was necessary for them to be cut in cardboard to maintain the shape. To cut cardboard accurately, practice and a large pair of shears were needed. When cutting the shears must be kept against the table in order to keep a steady hand, a straight eye and not to distort the paper/cardboard.

Pattern cutters stand to work in order to see over their work enabling accuracy. Standing also enabled the pattern cutter to 'cut off' the table. To 'cut off' the

table means the cardboard is held still and the pattern remains flat on the table to ensure accuracy. This was particularly necessary when working on a long length.

At times I was bored, the repetition was tedious and I wanted to do more in those first four weeks; however I am grateful for that month as I learnt basic eye to hand co-ordination, perfected accuracy and gained an understanding of the purpose and reason behind what I was doing. I was also familiarising myself with the curved shapes of the neck and armholes. I learned a pattern cutter only cuts pattern pieces for one side of the garment then indicates on the pattern the appropriate number of pieces to be cut and any other relevant information, straight lines may need to be right angled if mirrored. An asymmetric garment would be cut as a whole pattern. Each pattern piece joins to another piece and the machinist will follow the seam lines made by the pattern cutter.

Copying pattern pieces enabled me to feel shapes of different pattern pieces and to take in the information written on them. To help me understand the construction of a garment I put pieces together as if sewn to make sense of the process. If five pieces were needed to make up a jacket pocket I would learn why they were needed. During this process, be it conscious or unconscious I was absorbing information about pattern pieces and shapes and how these created a 3D form to fit a body.

The next learning stage involved the separate calico pieces of a toile and transferring them into a cardboard pattern. The toile once approved by the head pattern cutter or designer is then cut along the seam lines so each calico piece can lay flat becoming 2D. The calico pieces are nett which means they have no seams allowances. The pieces are marked with specific instructions for the pattern cutter such as the direction of a pleat, the centre front line, where stretch or ease is needed, the grain line, and balance notches. All information is to be transferred clearly onto the cardboard pattern pieces.

The calico shapes are traced around using a tracing wheel/raddle making sure the calico does not move. This creates a nett pattern and seam allowances need to be added to the pieces. How much seam allowance to be added is dependent upon a number of variables such as the fabric to be used, what type of seam to be used, where the seam falls on the garment and the purpose of the seam. The grain line is fundamental to each pattern piece as this instructs the person making the lay-marker which direction to lay the pattern piece on the fabric. Each pattern piece is continually checked against an adjoining piece to make sure the garment will sew together correctly. Knowledge of garment construction is essential in order to understand what is needed for each pattern piece and to enable the sample machinist to make up the garment. The pattern cutter, when more experienced, is able to help in advising the designer in the practicality of the necessary components to create the design they want. It is at this stage of the process that the pattern cutter needs to be able to communicate with the sample machinist so that any amendments to the pattern that would enable the construction of the garment to work better can be discussed. This process is checked again with the manufacturers before grading.

Becoming an experienced pattern cutter takes several years working closely in collaboration with the other departments involved in the process of producing garments for retail. With advanced automated machinery, developing technologies and new fabrics the learning process continues. As an example, the lay-marker maker could produce a more economical fabric costing if a small change was made to the pattern, this would need to be discussed with the pattern cutter to check the change does not hinder the fit and also for the pattern cutter to make any adjustments across all the sizes.

Having become familiar with cutting patterns and working with nett calico pieces, I learned to work on the mannequin. This process involved working with a block pattern and with calico, an integration of flat pattern cutting and draping. Using a block pattern already balanced with a correct fit to the mannequin is

time saving. Sometimes using the block would be inappropriate as a new silhouette would be wanted. When this happened the pattern cutter would need to drape the cloth directly onto the mannequin which takes longer and requires further skills.

Toiles can be sewn together on the machine, by hand or glued for speed. Proportions are of utmost importance in order to create the correct silhouette. A toile allows the designer to approve the interpretation the pattern cutter has visualised from the designer's sketch; it also allows the pattern cutter to correct their interpretation before making a 2D pattern. The toile needs to have all the nett lines clearly marked together with indication of any top stitching or fastenings so the final image can be seen. For fit purposes the centre front and centre back lines need to be clearly marked. The toile is normally half a garment to save time and cost however if the need arises a whole toile is made. Interfacings are not normally attached at this stage but an appropriate weight of cloth needs to be used to give the correct effect. A shoulder pad must be included if it is needed as this will determine how the pattern is cut. Handling the toile and working with the design fabric allows the pattern cutter to know how to cut the pattern. It was expected that the pattern cutter would understand the handle of fabric in order to instruct the cutting room and the production department in what was needed for construction. Considerations are limpness or rigidity of the fabric, the grain of the fabric, amount of ease tolerance required and the tolerance amount allowed for cutting slightly off the true bias; this is information that is needed to be communicated to the appropriate department. Examples of more restricting fabrics would be those with a one way nap/pile (e.g. velvet), knitted fabrics where the loops of the wales point the same way and fabrics with a one way design. All this would be recorded on the pattern pieces and on an attached specification sheet (Tyler, 2008).

The most important skill I learned was to master interpretation of the design sketch. Everything I had been doing from tracing around existing patterns to

creating toiles was in preparation to accurately translate a 2D sketch into a 3D garment, bringing together the desired image with a knowledge of the fabric making a pattern viable for production.

> 'The pattern maker's role is critical to the accurate translation of the designer's idea. It is important that the pattern maker accurately assesses from the sketch the following information: the overall silhouette desired, the amount of ease and the designer's desired proportions for the design details' (Davis Burns & Bryant 2007, p.257)

The design for a garment is not a reality in 3D form until the physical construction process has begun. Precision design engineer Paul Backett comments

> 'Despite the rise of digital tools and rapid prototyping, it has never been more important for designers to make things with their hands, if you can build it; you're halfway to knowing how it could be manufactured' (Backett, 2011).

During the years I spent in the fashion industry I worked closely with the designer as he/she was more accessible before the popular use of computerised pattern making distanced this relationship when production moved overseas. The designer, pattern cutter, sample machinist, grader, lay marker maker and cutter and the factory worked together in closer proximity. Personal communication meant that it was possible for a relationship to form between the different skilled workers; particularly between pattern cutter and sample machinist where creative dialogue was beneficial to making a better garment.

The creativity of making a garment design into a reality begins with the fabric and the pattern coming together, as a colleague put it "You get to know the feel of the cloth and its relationship with the pattern" (Senior Pattern Cutter, male, mid-fifties, South England, personal communication, May 2012). Errors do occur

and when they do it will entail returning to the pattern. This is one reason why I uphold that the relationship between the people involved in all the different processes is fundamental to creating a good quality garment and is something that the industry has lost in the twenty first century, despite the use of technology and electronic communication.

As new fibres are produced they bring new characteristics for the pattern cutter to work with; how the fabric pulls, stretches, falls and moulds. Each design is different to the next and silhouettes change, resulting in the pattern cutter continuously learning new skills, approaches and techniques.

'All outstanding fashion designers and creative pattern cutters have worked for years to perfect their skills' (Fischer, 2009 p.25).

1:4   FIT AND MEASUREMENT

'Securing accurate physical measurements is crucial to achieving successful fit' (Bye, LaBat & DeLong, 2006 p.67).

It may be argued that in a perfect world every individual person, be they small, tall, young, old, pleasingly proportioned or with special physical needs would like a personal garment maker assigned to them, creating their ideal garment. Every individual would have garments that fit the function they are required for, for instance to be comfortable to wear, the colour desired and the fabric to be the right texture and properties. Furthermore the garment would be of the design and shape desired and it would fit the individual in such a way that they have the perfect garment to move in.

'Everyone would like to afford garments tailored to their own size and shape, but these are expensive when cut singly and produced by highly skilled craftsmen with years of experience' (Beasley, 2004 p.116).

If this were a reality, certain elements would need to be available; an availability of diverse fabric supplies, unlimited financial resources, a skilled worker, tools to produce the pattern and the appropriate machinery to produce the finished garment. One essential tool would be a measuring implement, a tape measure. A tape measure is a manual method used to acquire accurate measurements to ensure a successful fit of a garment. Today a tape measure is still used in manual work and can be described simply as a flexible ruler. For body and garment measuring it is made out of ribbon, plastic or fibre glass and can be easily placed around the curvature of the body at different points to calculate the measurements required to make a flat pattern.

The adoption of the tape measure in the early 1800s meant the skilled tailor did not have to depend upon his experienced eye to create a pattern, 'Numbers became the standard measurement, replacing the tailor's personal observation

of special relations' (Zakim, 2009 p.280). Bespoke tailors refer to using one's eye as 'Rock of Eye' a skill still used today (Anderson, 2009). In the technological world of the twenty first century it is possible that the tape measure could become obsolete not due to using one's eye but due to the advancement of 3D scanners used for measuring 3D forms, such as the human body.

> 'The 3D body scanning technology today operates mainly by a triangulation system, whereby strips of vertical light are projected on to a subject and the image of this is captured by several cameras' (Beasley, 2004 p.119).

3D body scanning works within an accuracy of two millimetres and scans one hundred and thirty different parts of the body over the full 360 degree surface of the body.

> 'Technological advances in data collection and manipulation now provide both the ability to collect three-dimensional data that unambiguously specify the form of the body and the ability to manipulate efficiently the massive amount of data that results from specifying such a complex form' (Heisey, Brown, Johnson, 1998 p.1)

How measurements are taken is not the primary focus of this chapter, but the importance of an actual measurement is and the effect this has upon size and fit.

> 'In order to translate a body measurement to a garment pattern, there is a need to identify consistent body landmarks and to secure accurate physical measurements is crucial to achieving successful fit' (Bye, LaBat & DeLong, 2006 p.67).

For further reading on how measurements are taken and methods used see *'Analysis of Body Measurement Systems for Apparel'* by Bye, LaBat & Delong (2006).

From personal experience of working with fashion students I have come to realise that the appreciation of measurements has been lost, not surprising when the size variation from one retail label to another is so confusing. In a response to a Sunday Telegraph survey 'Overall, twenty eight out of fifty garments checked were found to be larger than on the label' (Jamieson, 2011). I suspect this is one reason why young people from my experience as a technician are not aware how important measurements are in order to create a pattern and that a standard sizing is required if garments are produced for mass production.

An anecdotal example

A colleague showed me a dress she had recently purchased. Immediately I noticed the label in the back neck and remarked upon the size, ''an extra-large? You are not an extra-large'' ''No, I'm a 12, it fits, it's made in India, maybe people are smaller there'' (female, mid-fifties, Bedfordshire UK, personal communication, May 2012). Within this short verbal exchange there are three points of reference 1) the size on a size label need have no resemblance to the size of the person, 2) the reference to a general number representing a size gives the perception of a certain body fit and 3) where a garment is made can affect what size to buy. Generally, from my experience women have little idea what they actually measure. I measured my colleague using a tape measure; she measured bust 94cm/37", waist 84cm/33" and lower hip 99cm/39" (due to her waist measurement she buys men's trousers as men's trousers have larger waist circumferences). These measurements when compared with the British Standard Measurement chart for women (see appendix A) are a size 14. According to a report by UK Fashion and Textile Association (UKFT, 2012) 37% of women in the UK are a British Standards Measurement size 16 and over, therefore size 14 is not an extra-large.

Women's bodies have changed since the last national survey in 1951, comments Professor Philip Treleaven from University College, London, who led the latest

size research in the UK and stated that women's waist measurements have grown by sixteen and half centimetres, the equivalent to six and half inches over the past sixty years, 'Our hour-glass has rolled into a barrel-like shape' (Lambert, 2009).

An added difficulty of relating size with body measurements is due to the popular use of jersey fabric and fabrics containing stretch yarns because the amount of stretch in a fabric allows a size 14 woman, herself unaware of her actual measurements, to fit into a size 10 label. Therefore a size 10 is how she refers to her size without being aware of standard measurements. This is further complicated by how her size may vary from one brand label to another and the same size being represented differently from country to country. Perhaps one way round this problem would be the label giving a measurement size rather than a number size? I.e. instead of stating 'size 12' it reads 'waist 68-74cms', this too could eliminate the stigma of being a 'large size'.

In Europe, below represent the same size;

12 in UK

C38 in Norway, Sweden and Finland

40 in Belgium and France

38 in Germany and the Netherlands

44 in Italy

44/46 in Portugal and Spain

(10 in the USA)

(Taken from BSI, the British Standards Institute, 2011)

To make sizing easier for the everyday shopper, the UK has adopted a standard European sizing to ease purchasing for customers. This is called BS EN 13402 (BSI, 2011). With this standard development the hope is to reduce in the number of

returns to mail-order companies where size is the complaint and also to reduce cost for manufacturers as all measurements are metric under this standard. At present the British Standard Measurements for women B3666 1982 are based on National Surveys which were undertaken during the 1950s (Beazley, 2004). Recent studies by the UK National Sizing Survey, have resulted in showing that not only are UK women less curvaceous but are heavier and taller than they were sixty years ago (Lambert, 2009).

See appendix A for the present B3666 1982, page 97.

Without a standardisation of measurements representing a certain size the manufacturing of ready-to-wear garments would have been impossible to produce. Godley (1997) suggests that it was in fact the development of standard sizing and fixed measurements, rather than the introduction of new machinery in the 1860's, that was the innovation behind enabling ready-made clothing. Although BS EN 13402 measurement system is to be applied in the near future, this does not mean retail size labels will become uniform because there is no requirement for the manufacturer of high street retail shops or design labels to use British Standard size measurements (Edkins, 2009). The study of pattern comparisons as part of this research highlights the importance of understanding the principal of measurements and is fundamental in creating an initial garment pattern. The grading of patterns for the production of different sizes of the same style are equally relevant because measurements and understanding body proportions become even more important when working with extreme body sizing from petite to extra-large. Measurements increase and decrease around the body from the original size pattern and either end of the size scale will alter the body form in such a way that the garment will need re-balancing. There is change in posture, the curvature of the back and general proportions. Large does not necessarily mean taller or slimmer mean shorter, there are as many variations of body shape as there are individuals.

"Thus, for a garment to meet the needs and desires of the consumer, body measurements and comfort and ease preferences must be translated into garment measurements and integrated with other variables such as garment design and fabric variations" (LaBat, 1987: cited in Bye, LeBat & Delong, 2006, p.76)

I suggest one way the industry at present works around the issue of sizing is to create styles that result in being less-fitted in order to cover a broader demographic of body shapes and to use jersey fabric not woven cloth. Where mail order and e-shopping is concerned, trying on a garment before buying is not an option, therefore elasticated waists, non-turned-up hems, generously cut tops, stretch fabrics and a choice of two dress lengths all enable a variety of women to fit one particular standard size (McDevitt, 2003). Voellinger Griffey and Ashdown (2006) comment that good fit is frequently cited as one of the most desired attributes of clothing and that an unproved method for providing good fit for all women is needed.

Once, pattern making was considered to be a highly skilled profession as tailors meticulously worked at measuring their clientele and the pattern made would be a personal pattern for that particular client (Anderson, 2005). The pattern made for the individual client would be stored under their name and would be solely used for them; alterations would be made to the pattern as the client's body shape changed over the passing years. The above method is being reintroduced in the twenty first century with mass customisation. Mass customisation uses technology that has been developed and is in the process of further development that allows the clothing manufacturer to manipulate designs quickly and easily at minimal cost. In doing so a customer can personalise the fit and fabric of a particular garment style (K. Saravann, 2009). With new technology such as the high-tech 3D scanners, manufacturers and retailers in the clothing industry can attempt to emulate an individual service by producing better fitting garments for the majority of women who need a moderately priced garment.

Researcher's own pattern. Weldons 1940's suit.

Sizing and cloth amounts are printed on the back of the envelope.

Sizing can be compared with appendices A and B.

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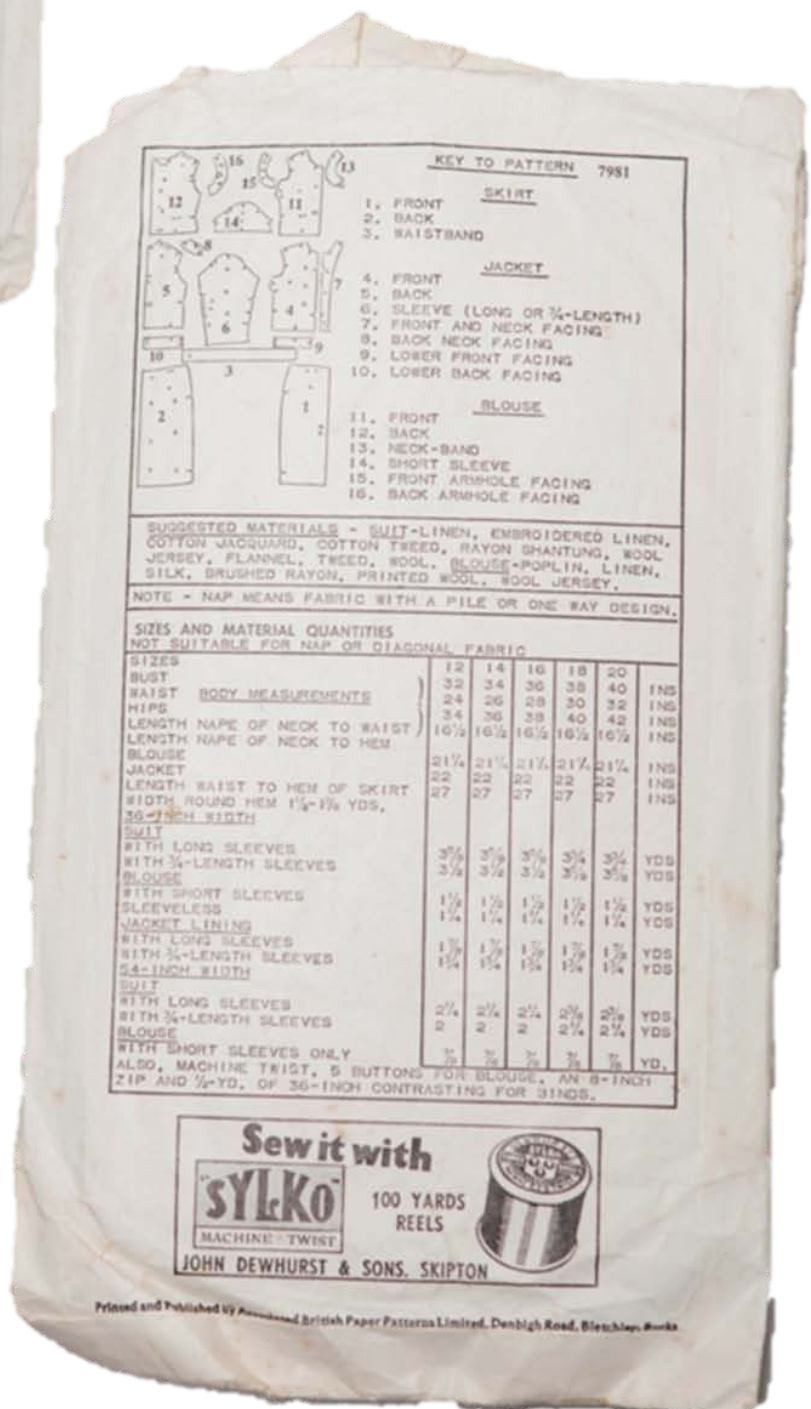
CHAPTER 2:   DATA AND ANALYSIS

2:1 PRACTICAL STUDY 1. THE PATTERN STUDY

The aim of this practical study is to demonstrate the differences and similarities that occur between working digitally to make a pattern and working manually to make a pattern. The study will explore the ability to visualise and interpret a garment design from a 2D sketch to produce a pattern.

As a practitioner in this practice-led research I took the decision to put myself in the role of designer for this exercise. The reason for doing this was, in order to evaluate the pattern created from a designer's sketch, it was necessary as the researcher to know precisely what the designer desired. The only way for me to know the intentions of the designer was to be the designer.

Taking the role as designer meant I could not be a pattern cutter in the study as well as this would run the risk of bringing a biased result to the investigations. It was also inappropriate for me to be a pattern cutter because as researcher I needed to separate myself from being part of the study in order to evaluate the interpretation and visualisation abilities of other pattern cutters/makers. As designer I was aware of how the end garment should look and fit according to my sketch and as a professional pattern cutter I was able to apply my knowledge as how best to analyse and compare data from the outcomes of the practical studies.

Below are three aspects for evaluation that I used to determine the aesthetics, size and comfort;

- Interpretation of the design sketch

- Comparison of garment measurements

- Assessment on the fit of the garment when worn

Interpretation of the design sketch

The first observation the pattern cutter/maker needs to be aware of when interpreting a design is the overall shape of the garment, this is the silhouette. See page 38 for the blouse and skirt design used for this study. The silhouette is the first impression the designer will have when they see their design made into a garment.

The pattern cutters/makers need to have the ability to visualise the finished product and to understand the fall and fit and the construction of the garment in order to create the designer's desired image. These are fundamental requirements.

The ability to visualise the 2D sketch into a 3D garment requires the consideration of dimensions and proportions of the details in the garment design. This includes measurements and fit of the garment.

Comparison of measurements

By gathering quantitative data the difference in measurement that can occur from one pattern to another is highlighted when comparing the different pattern cutters/makers work from the same design sketch. These comparisons also highlight the debate that arises regarding the importance of the pattern cutter/maker having the ability to visualise in 3D in order to interpret what is illustrated in 2D.

Assessment of the fit

The fit is monitored by assessing whether the garment has been finished to certain measurements and size and how the garment feels when worn. 'Feels' can be argued as subjective and therefore not appropriate to bring to a research project, however if a garment when tried on in a retail store does not feel comfortable or feel how the customer expects it to then the customer will

possibly not purchase the garment. How the garment feels when it is worn is an important component to this study.

The assessment of the fit and proportion of the garment includes looking at how the garment has been constructed and how it feels when worn. How a garment is constructed is a reflection on how the pattern has been made, taking into consideration the suitability of the cloth used and whether the pattern has been produced in a way that reflects the design and is compatible with production procedures.

CONSIDERATIONS FOR PRACTICAL STUDY

- The Design

I assumed the role of designer. My decision to illustrate the design by hand on paper was made with consideration. The alternative to a free hand sketch was to produce a flat or working drawing using Computer Aided Design (CAD). I did not choose to work with CAD for the reason that I am neither trained nor confident in CAD and am unable to produce an illustration this way, I could have asked someone else to illustrate my design using CAD however this would have added another variable to the process which seemed unnecessary and time consuming. I enquired to how the chosen pattern cutters/makers would prefer to work and a hand drawn design was perfectly acceptable.

- Research cloth for design

It was important that the cloth used for the blouse and skirt designs were of the right characteristics to produce the correct result. The skirt cloth is 100% wool which was chosen for its stability, weight and thickness and the lining for the skirt is a synthetic lining fabric. The cloth for the blouse is a light weight 100% cotton voile which has the appearance and characteristics of soft drape and slightly transparent. Both cloths have been chosen to fit the price range suitable

for the retail market for the professional woman. The appropriate fusible interlining and trimmings were also supplied.

- Research pattern cutters/makers

Four different pattern producers were each required to create the blouse patterns, two of these were also asked to create the skirt pattern.

Referring to freelance services advertised in *Drapers* I sourced a Gerber pattern maker and a manual pattern cutter experienced in soft casuals. I was further recommended another experienced manual pattern cutter and the second Gerber pattern maker was the first listed using Google internet search engine.

None of the pattern cutters/makers were required to make a toile before creating the pattern and this was accepted. The pattern cutters/makers did not see each other's work.

- Send design to pattern cutters with swatch of cloth

Each pattern cutter/maker received an identical hand drawn sketch of the skirt and blouse design together with a swatch of the cloth for both garments. Each pattern cutter/maker was given waist, bust and lower hip measurements that the garments were to fit along with the appropriate finished lengths. The measurements given fit British Standard size 12.

- Receive patterns

Once the patterns had been made they were posted to me together with the sketch and an invoice.

- Cut out garments in the cloth as the patterns instruct

All the patterns were cut out by hand by the same person and as the pattern instructed, including lining and interlining as indicated on the appropriate pattern pieces.

- Send to machinist

Once the garments were cut out they were delivered by hand to an experienced sample machinist, recommended to me by a colleague, who made up all four blouses and the two skirts. Using one machinist ensured that the garments were all handled the same. The machinist was given no information about the individual pattern cutters/makers.

- Receive garments back

When the garments were completed they were collected by hand and then assessed and monitored. It was not until the garments were completed that monitoring of the patterns took place.

- Collate data

Data was collected and recorded by comparing the pattern shapes and measuring the garments using a tape measure and by wearing. I tried the blouses on and as designer I was able to acknowledge how the blouse felt when worn. My personal measurements match that of British Standard size 12.

VARIABLES

There were many different types of clothing that could have been used to demonstrate this particular study; however I chose to use women's separates.

Generally there are more design variations for women's wear than for men's and more pattern cutters/makers familiar with women's wear. It was easier to access pattern cutters/makers for a woman's garments.

Originally my thought was to work with women's outerwear, such as a jacket or coat. Jackets and coats require more complex skills and knowledge due to the structure, outer cloth, lining and interlinings to maintain the shape and on further reflection I considered the amount of diversity and variables that would occur with outerwear. With the added expenditure and time involved with outerwear I decided separates were more appropriate. I did not choose trousers as a pair of trousers can entail more complex fitting problems than a skirt. I chose to design a blouse rather than a shirt for the reason that there is a requirement of more sensitive interpretation with blouse details and silhouette whereas in my opinion a shirt is more traditional in shape.

With the contrast of a basic skirt shape and a softer blouse with added design features a good overview of skills could be interpreted and monitored.

CONSIDERATIONS FOR THE DESIGN

One aspect of this practical study was to monitor the interpretation of fit. For this reason I designed a simple skirt shape that fitted the body at the waist and hip. This meant the skirt needed to fit the smallest circumference of the body which is the waist, and the largest circumference of the body which is the lower hip. Because the design of the skirt consists of a basic silhouette it enabled monitoring the body fit with least variables.

In contrast I designed the blouse with a loose body fit so that interpreting the blouse design would require more creative visualisation. The blouse was consciously designed with the added detail of pleats and gathers as well as a collar, sleeve, front opening and cuff. These features were important so that

interpretation of the designer's sketch could be monitored not only for fit and silhouette but for creative translation.

- Technical description of skirt

The skirt length is above the knee and fully lined. It is fitted on the waist and over the hip line falling straight to the hem line. There are eight darts, four in the front and four in the back. The centre back has a zip opening with a button fastening on the waistband. There is an open vent in the centre back seam at the hem line. The waistband is interlined.

- Technical description of blouse

The women's blouse was designed with an element of softness and fullness to the silhouette shape. Features included in the design are; a collar, cuffs and cuff opening, gathers on the main body front and back and also the sleeves, horizontal pleats, full length sleeves and a centre front button opening. The collar, cuffs and front facing are interlined.

- Information given to the pattern cutter/maker

A swatch of cloth was attached to the sketch so the pattern cutter/maker had an understanding of what the garments were to be made in and could therefore create the patterns accordingly. The cloth and the sketch supplied to each pattern cutter/maker were identical. The pattern cutters/makers only received minimal but essential measurements as previously mentioned because I wanted to assess their ability to interpret proportion. The pattern cutters/makers were also told which retail market the garments were intended for.

The four blouse patterns are referred to as Blouse A, Blouse B, Blouse C and Blouse D, the two skirts as Skirt B and Skirt D, to maintain anonymity.

Price of making the blouse pattern	Price of making the skirt pattern
A £30	B £45
B £70	D £35
C £96	
D £55	

Price varies, and as can be seen above, computerised patterns B and C are more expensive than when manually cut. However the advantage of a computerised pattern is that it is stored electronically and therefore copies are readily available, as a colleague commented

> "The Gerber system is only useful for orders of 500 and over and for all sizes. It is a technological development for mass production" (Pattern Cutter/Maker, male, late fifties, South England, personal communication, May 2011).

BLOUSE AND SKIRT DESIGN
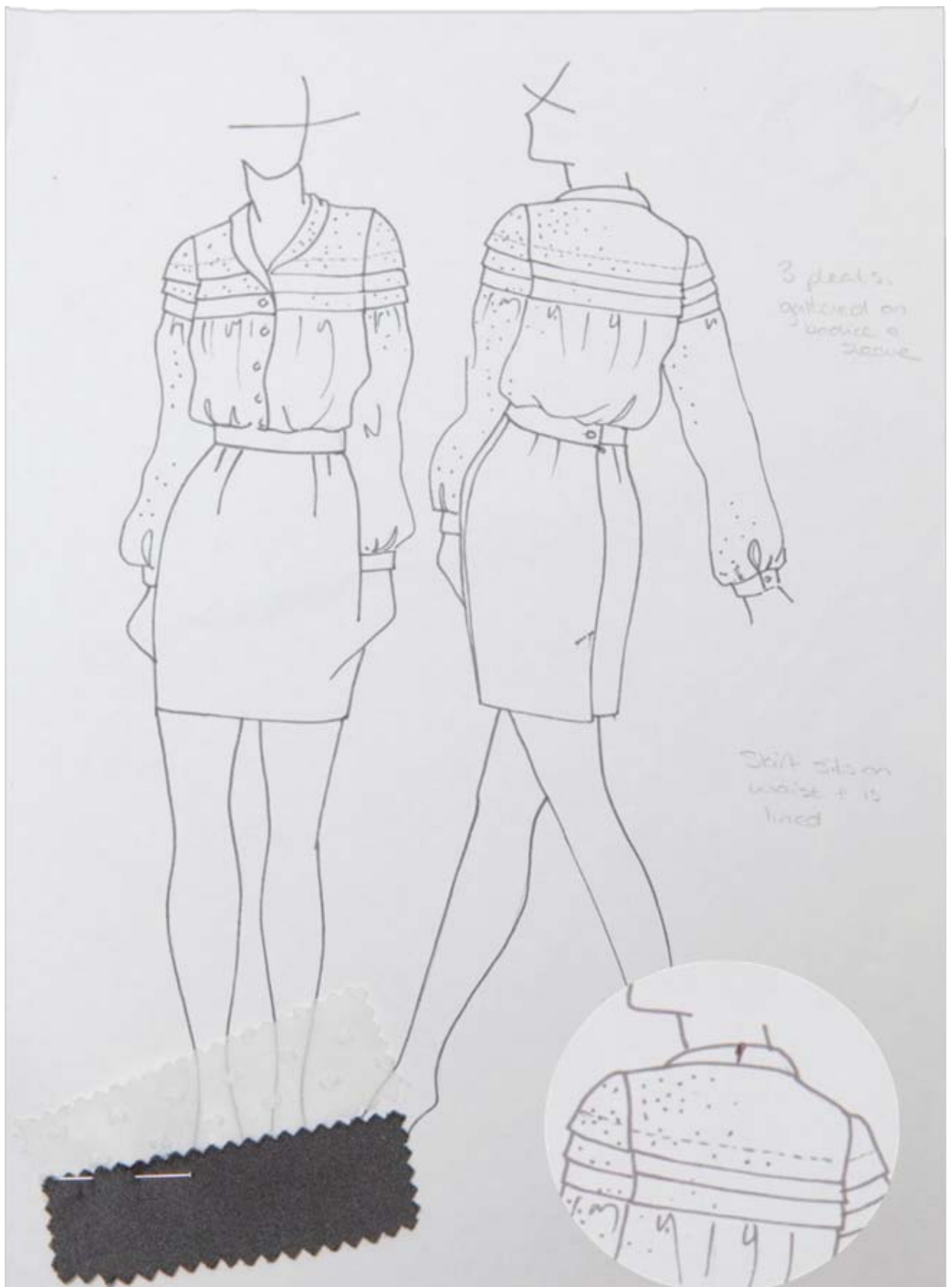
Hand sketch by researcher.

Insert shows the centre back collar seam that has been added by the pattern cutter.

BLOUSE A

BLOUSE B

BLOUSE C

BLOUSE D

BLOUSE A

BLOUSE B

BLOUSE C

BLOUSE D

BLOUSE A

BLOUSE B

BLOUSE C

BLOUSE D

INTERPRETATION OF BLOUSE DESIGN

The table below shows key points of the blouse design that the pattern cutter/maker needs to interpret. In order to translate the designer's sketch correctly these key points are assessed with regard to proportion and the use of the choice of fabric to create the garment as illustrated.

Each blouse has been assessed from the designer's view point.

1   not the desired look
2   needs substantial change
3   needs moderate change
4   needs little/acceptable change
5   desired look

Key Reference Point	A	B	C	D
Over all silhouette	1	1	5	5
Collar depth	4	1	3	4
Collar shape	3	2	2	4
Pleat depth	2	2	5	5
Pleat position	1	3	5	5
Amount of gathers	2	1	4	5
Fall of sleeve	2	3	5	5
Cuff depth	1	1	5	5
Total	16	14	34	38

COMPARISON OF BLOUSE MEASUREMENTS

Measurements are in inches on the left and in centimetres on the right

Measurement points on garment	A		B		C		D	
	ins	cms	ins	cms	ins	cms	ins	cms
CB length, from nape of neck to the hem	25 1/2	64.7	24	61	24	61	24	61
Shoulder length, from neck point to armhole seam	4 3/4	12	4 1/2	11.4	4 3/8	11	4	10
Sleeve length, from shoulder point (armhole seam) to edge of cuff	25 3/4	65.3	25 1/4	64	25 3/4	65.3	25	63.5
Cuff depth	2	5	1	2.5	1 1/4	3	1 1/4	3
Cuff width around wrist when buttoned	8	20	6 1/2	16.5	8	20	8	20
Collar depth at the centre back	3	7.5	1 3/4	4.5	1 3/8	3.5	3 1/4	8
Total bust, level with underarm with gathers relaxed	37 1/2	95.2	35	89	37 1/2	95.2	37 1/2	95.2
Across front chest, along top pleat edge	14 3/4	37.5	12 1/2	32.7	13	33	13	33
Across back, along top pleat edge	15 1/2	39.3	13 1/2	34.2	14	35.5	13 3/4	35
Depth of armhole, from shoulder point perpendicular to underarm	8 1/2	21.5	7 1/2	19	8 1/2	21.5	9	23

ASSESSMENT ON PROPORTIONS AND FIT OF BLOUSE

A	The collar is seamed at the centre back and sits away from the neck causing it to be too big. The pleats are too deep and the stitching lines show. The pleats are positioned too low on the blouse and pull tight across the body and arm. The facing is too wide therefore the transparency of the fabric is lost. The sleeves are too long. There is a pleat instead of gathers joining the sleeve to the cuff and the cuff depth is too wide. The upper arm on the sleeve is very tight. This blouse is an uncomfortable fit.
B	The collar is seamed at the centre back and is too narrow and small in shape. The pleats are not deep enough and the stitching line shows. The position of the pleats is too high across the chest area. The facing is too wide therefore the transparency of the fabric is lost. The sleeves are slightly long and the cuffs are too narrow and too tight. There is a lack of gathers across the body creating an incorrect silhouette due to lack of fullness. The front of blouse is too short as it is curved upwards. The blouse is a size too small therefore uncomfortable for a size twelve.
C	The collar is seamed at the centre back and the shape is too small and narrow. The pleats are positioned well and are the correct depth. The front facing is the correct width for the fabric and style although there is no need for a back neck/shoulder facing. The sleeves are long. The cuffs are the correct depth and width. There is a correct amount of fullness in the gathers creating a silhouette that reflects the designer's sketch. This blouse is a comfortable fit.
D	The collar is constructed correctly though it is too wide in shape. The pleats are positioned well and are the correct depth. The front facing is the correct width for the fabric and style. Sleeve and cuff are correct proportions. There is a correct amount of fullness in the gathers creating a silhouette that reflects the designer's sketch. This blouse is soft, loose and is a comfortable fit.

My criteria for the analysis above were to judge not only how well the 2D design had been interpreted into a reality but also how the blouse looked and felt when worn.

CONSTRUCTION OF THE BLOUSE PATTERN

The number of pattern pieces required to construct the blouse design as illustrated are ten.

1. Top back bodice
2. Lower back bodice
3. Top front bodice
4. Lower front bodice
5. Front facing
6. Upper sleeve
7. Lower sleeve
8. Cuff
9. Sleeve binding strip
10. Collar

Only blouse D had the correct pattern pieces. A, B and C had misinterpreted the sketch by putting a centre back seam in the collar, creating what is called a shawl collar and therefore only produced nine pattern pieces.

The design sketch showed no centre back seam in the collar (see page 38) and therefore required a separate pattern piece, creating ten pieces altogether (see page 48).

Blouse C pattern did have ten pieces due to an additional piece made which is an inside yoke going across the back bodice and neatening the back neck. In this instant this is an unnecessary pattern piece and in production this would increase the making price and increase fabric cost for that garment.

LOWER FRONT PATTERN PIECES
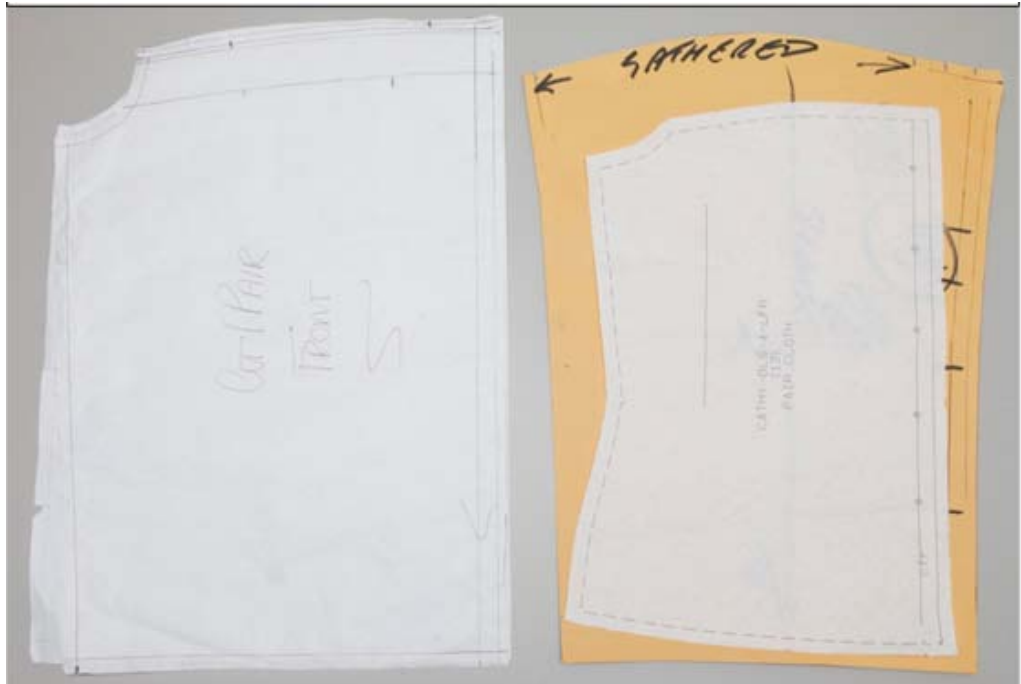
BLOUSE PATTERNS C & D   BLOUSE PATTERNS A & B

LOWER BACK PATTERN PIECES

BLOUSE PATTERNS C & D   BLOUSE PATTERNS A & B

The difference between pattern pieces A and B is obvious. Pattern pieces C and D are similar and create a good silhouette when made into a garment.

SLEEVE PATTERN PIECES
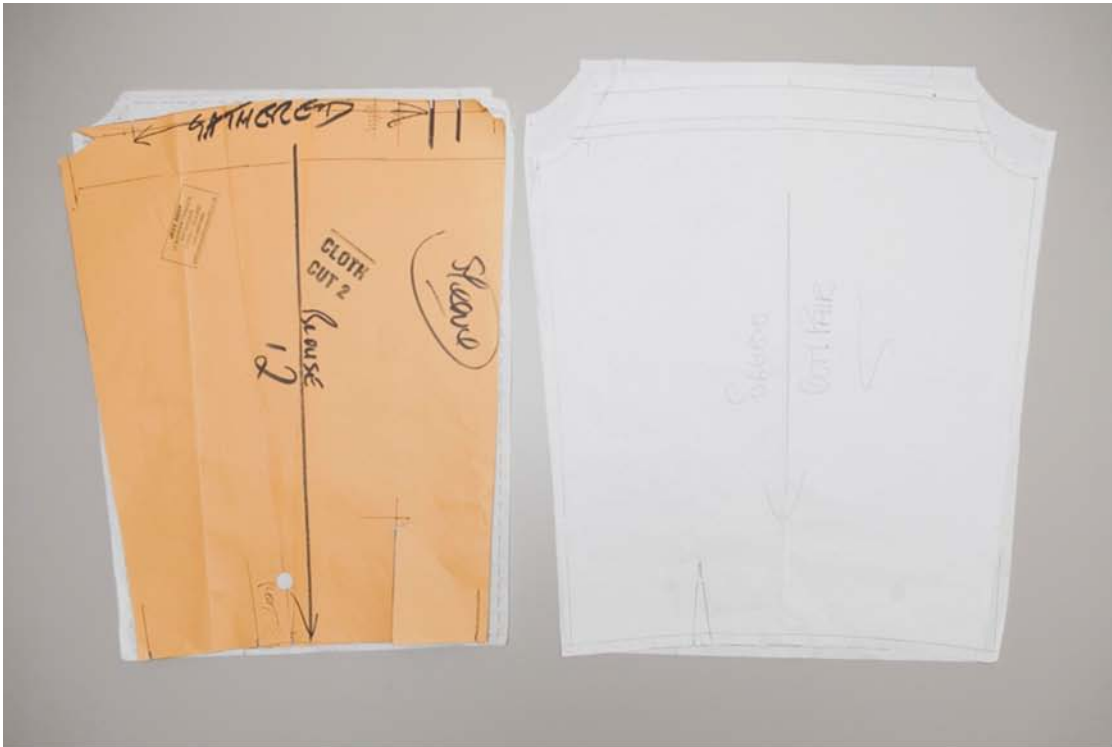
BLOUSE PATTERNS A & B   BLOUSE PATTERNS C & D

CUFF PATTERN PIECES

A

B

C

D
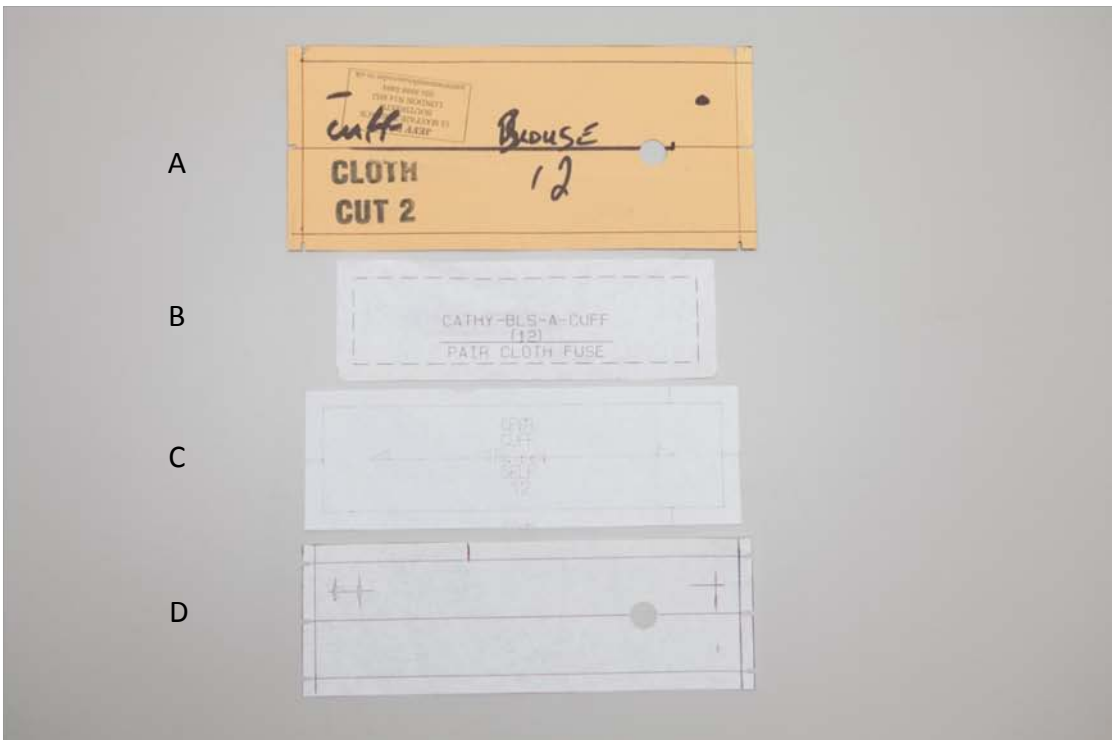
UPPER FRONT PATTERN PIECES

BLOUSE PATTERNS A & B   BLOUSE PATTERNS C & D

FRONT FACING PIECES

A   B   D   C

The only correct interpretation is pattern D, which has a separate collar piece.

UPPER BACK YOKE PIECES (PLEATS FOLDED)

TOP PATTERNS C & D   BOTTOM PATTERNS A & B

A & B   PLEATS EXTENDED

Pattern pieces A and B showing the difference of body fit and pleat size.

SLEEVE HEAD PATTERN PIECES (PLEATS FOLDED)

TOP PATTERNS A & B   BOTTOM PATTERNS C & D

(PLEATS EXTENDED)

PATTERNS C & D   PATTERNS A & B
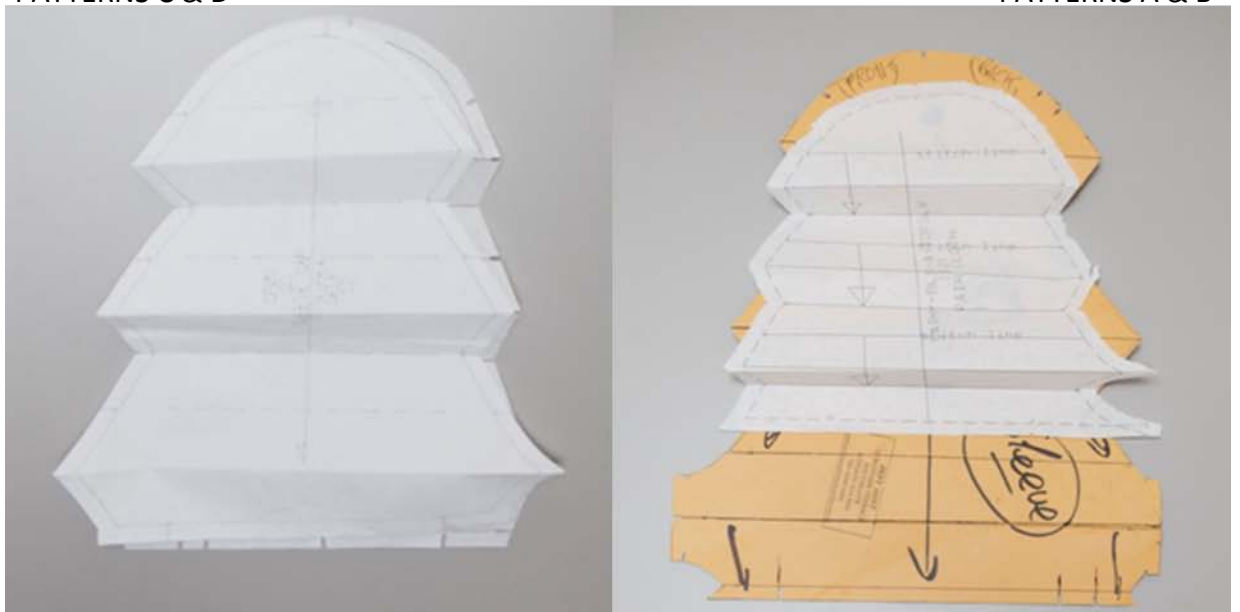
As well as size difference between patterns A & B, Pattern B (on top of A) shows an incorrect grain.

OUTLINE OF THE PATTERN CUTTERS/MAKERS

	AGE	YEARS EXPERIENCE	METHOD USED	ADDITIONAL INFORMATION
A	61	Forty three	Manual Pattern Cutter	Trained as traditional manual cutter + years as a garment technologist
B	30	Nine	Gerber Pattern Maker	University +two years in industry and 4 days Gerber training
C	36	Fifteen	Gerber Pattern Maker	University + trained in-house by a traditional pattern cutter
D	60	Forty two	Manual Pattern Cutter	Trained as traditional manual cutter also uses Gerber PDS

OUTCOME

From analysing the data of the four blouses, blouse D fulfils the requirements matched to the designer's wishes regarding interpretation and fit.

Blouse patterns C and D both made a comfortable fit garment with good proportion of details and silhouette. Blouse pattern C was made by a pattern maker using the PDS and blouse pattern D by a manual pattern cutter.

The manually cut pattern for blouse D created the better interpreted garment as the collar was without a centre back seam, as the sketch indicates, however the collar needed to be slightly narrower. The collar on blouse C had not been interpreted correctly as it was created with a centre back seam which was not on the sketch; the collar was also too narrow. The fit, measurements and interpretation of the design on both these blouses was good and similar to each other.

Blouses A and B were not a good fit and the patterns were therefore incorrect. Blouse pattern A was made by a manual pattern cutter and blouse pattern B by a pattern maker using the PDS.

This study took place to compare patterns made manually and those made using the Gerber PDS. The blouse pattern assessments indicated that the outcome did not depend on whether the patterns were made manually or computerised, but was dependant on factors other than the technique or procedure. The outcome has indicated that the ability to interpret a designer's sketch into a flat pattern and make a garment that fits appropriately is dependent upon the individual producing the pattern and their capability (skills), training and experience.

It appears that all three above components of skill, training and experience need to exist to create a satisfactory garment. The use of the word skill in this context is referring to the ability to interpret the design sketch into an accurate reality.

From the data tables and the outline of the pattern cutters/makers it can be deduced that;

- Producer of blouse A has experience and training but poor skills
- Producer of blouse B has lack of experience and lack of training outside of university and poor skills
- Producer of blouse C has experience and training and good skills
- Producer of blouse D has experience and training and good skills

The above illustrates that this study is not conclusive; there are additional human variables involved; the ability to learn and take in new information and creative competence and dexterity. Logic might assume that lack of experience together with lack of training would result in poor skills, while this is the case with blouse B, blouse A did not fit into this category. With years of experience and traditional training skills it could have been assumed that the pattern produced for blouse A would be satisfactory, but this was not the case.

The human factors that could account for this outcome are;

- The pattern cutter wasn't concentrating
- The pattern cutter has less experience cutting blouses
- The pattern was cut in a hurry with a lack of considered decisions
- The pattern cutter's attitude towards their work was poor

A pattern cutter/maker can learn to interpret and to visualise but these abilities are dependent upon the individual and therefore a constant cannot be deduced from this research.

As demonstrated, using different pattern cutters/makers to produce the same style can cause difficulties. One reason for this can be that the pattern cutters/makers are working from different block shapes, however regardless of the block shape used the design still needs to be interpreted correctly. The pattern cutters/makers may also be given a measurement specification sheet along with the design but a silhouette can still be different or incorrect if the pattern cutters/makers are not able to visualise the shape in 3D. Using varying block patterns will lead to variations in how design proportions translate due to the limitations of the of the block dimensions. This emphasises the importance of interpretation.

> 'One of the potential problem areas when using pattern contractors for pattern making has to do with the base [block] pattern used, two contractors producing styles for the same line might not use identical base patterns for pattern making'(Davis Burns & Bryant, 2007 p.257).

This can cause difficulties when producing a collection as this can result in the risk of differences in fit of finished garments and therefore inconsistency within the collection.

Davis Burns & Bryant go on to say

> 'more offshore contractors now have computer pattern making systems that eliminate many of the problems that apparel companies previously encountered when they had contractors perform the pattern making functions' (2007 p.257)

I agree: problems can be rectified more easily and quickly with computerized pattern systems, as information, including which block to use, can be electronically sent to contractors enabling and ensuring use of identical shapes. In the manufacturing process the use of PDS is essential due to the offshore geographical distances. However, regardless of the speed that technology brings in rectifying problems there is, as the previous quote highlights, a need to correctly translate a designers sketch.

My conclusion to this practical study is that blouse D pattern cut by pattern cutter D produced the most satisfactory interpretation and construction of the blouse design. This is because the collar construction was interpreted correctly and the final silhouette and proportions of the blouse were interpreted correctly according to the designer. Pattern cutter D has experience, training and skills, however the reasons for my conclusion are limited because the study involved only four individual pattern producers and because the study has shown there are a number of human variables that affect the results. I therefore suggest a more conclusive result could be achieved if the study was repeated using a greater number of pattern producers over a broader age range and background.

SKIRT PATTERN

Unlike the blouse the purpose of the skirt exercise was to monitor how two different techniques of pattern creating dealt with the fit of a basic garment shape. The pattern cutters were given three measurements for a size 12 skirt; waist 28" (71cms), lower hip 37$1/2$" (95.5cms) and the front length from under the band 18" (46cms).

COMPARISON OF SKIRT MEASUREMENTS

Measurement points on garment	B		D	
	ins	cms	ins	cms
Full waist	26$1/2$	67.5	27	69
Front length from under the waistband	17$1/2$	44.5	17$3/4$	45
High hip (8cms under band)	34	86.5	34$1/2$	88
Lower hip (18cms under band)	36	91.5	36$1/2$	93
Width of waistband	1$1/2$	4	1$1/4$	3.25
Back vent length	7	18	5	13

OUTCOME

There was little to interpret regarding detail of the skirt sketch. The waist, lower hip measurement and the front length were given to the pattern cutter/maker. The points of reference vulnerable to interpretation were the waistband width, positioning of the darts and the back vent opening.

From the table above it can be seen that both garments measure smaller than the measurements requested to fit a standard size 12.

On measuring the patterns, the measurements on both patterns are as the measurements given for a size 12. The finished garments measure smaller. This is an example of how measurement amounts can get reduced in the making up of a garment, which is why tolerance is added when pattern cutting. The amount of tolerance is subject to the style and the fabric. One reason the two skirts in this study measure small is lack of tolerance (extra amount) on the pattern, another is possibly shrinkage when steam pressed because the fabric is 100% wool. If the skirts were to go into production the patterns would need altering before grading to allow for tolerance. The patterns would also need to be marked clearly that they are to be used for 100% wool only.

Generally, waistband patterns are often made with an added amount (i.e.; 1cm) as the nature of bringing together layers of fabric will automatically steal from the finished measurement, meaning the amount of thickness can create a smaller measurement. This had not been allowed for in either skirt which explains why the waist measurements are small.

The positioning of the darts on each skirt differs from one another. The darts are functional for fit purposes and in this case not a design feature. The waistband is slightly narrow on skirt D.

A noticeable difference between the two skirts is the back vent opening. Using the skill of interpretation the vent on skirt B is too long in proportion with the

overall length of the skirt and the construction of the vent is inferior. Skirt D fits well and the fall of the skirt is good. The vent is a better interpretation and is of good construction. The fit of both skirts can be seen on page 58. The same model was used for the two skirts.

When looking at the expertise of the pattern cutter/maker of these two skirt patterns it can be seen, as with blouses B and D that pattern maker B lacks experience, training and skills which has resulted in a less satisfactory garment. Pattern cutter D who produced the pattern for skirt D has experience, training and the skills to produce a more satisfactory garment regarding fit, construction and measurements and proportion.

However to formulate a more comprehensive conclusion this exercise needs to be repeated, comparing a greater number of pattern cutters and pattern makers when producing patterns from identical design sketches.

SKIRT B

SKIRT D

2:2 PRACTICAL STUDY 2.   APPLING MANUAL SKILLS TO COMPUTERISATION

This second practical study applies a phenomenological approach as I describe learning new skills from a personal experience. I am the active participant in this exercise placing myself in the role of a trainee learning to use the Gerber Pattern Design System (PDS). I realise that it is impossible to bring a completely objective overview to this exercise, conscious that my preferred approach in creating patterns is manual and interpreting design detail and proportions by eye. However, I am aware of this and endeavour to maintain objectivity throughout the exercise to analyse adaptations necessary when applying manual skills to computerisation. I am interested in this process to help me understand better and to experience directly how relevant the knowledge of traditional manual skills are when using the PDS.

METHOD

I conducted this experimental exercise by keeping personal notes over eight days, recording my experience, observations, applied theory and skills while familiarising myself with the PDS. During this period I was accompanied by a professional pattern maker for one day who has over twenty years' experience using the Gerber PDS. At the end of our day working together, the PDS pattern maker set me a practical task in order to help me learn how to use the PDS; to produce a dress pattern from a hand drawn sketch using the PDS. I decided to include this in my research creating two parts to this second practical study

1) Transferring manual skills and learning to use Gerber PDS
2) Comparative study of interpretation and application of dress pattern

The purpose of practical study 2 was not only to experience a technological method of producing a pattern but to monitor how to maintain a standard of pattern creating. I had previously attended a three day introductory training offered by Gerber Technologies and referring to their instructions I began the process of using the Gerber PDS by digitising block pattern pieces into the

storage data. Once these pattern pieces were stored in the system I could begin to use and learn the different functions to create patterns for new designs.

1) Transferring Manual Skills

I began by digitising block patterns. On my fifth attempt I successfully digitised a block pattern complete with notches and internal markings. Due to several errors made before succeeding I had become familiar with how to correct mistakes when digitising and storing pieces.

An immediate obstacle was the use of language on the PDS. A number of descriptive phrases and words differed to that of manual work. Knowing the different coordinates and functions to use to achieve an action was complicated, and translating what I wanted to do into PDS and learning the PDS language was a hazard. Approaching the making of a pattern on computer screen brought an analytical approach to the process which is a different way of working for me. Another immediate difference was the constant use of measurements before performing an action. When working manually, particularly on the mannequin, making judgements by eye is generally used more readily in interpreting shapes and distances, because I work this way it was difficult for me to understand and grasp the new vocabulary and then convert it to the necessary action, it took time. Someone without manual experience but with technology skills would possibly adapt far quicker to the different functions. At the end of two days I had a long list of questions that needed answering because of my limited knowledge of PDS which meant I could not proceed. I was finding the process frustrating constantly wanting to use my wrist and arm to bring movement to the pattern shapes as the mouse used for PDS moves a minimal amount when creating a line for on screen pattern pieces. The amount of functions that were sometimes needed for one action was also infuriating.

However, experiencing the PDS directly I admired the capabilities and range of possibilities it offered. On the fifth day I appreciated one to one input received from the professional PDS pattern maker bringing clear explanation. The PDS needs to be explained thoroughly step by step from a user with expertise.

OBSERVATIONS WHEN TRANSFERRING FROM MANUAL TO USING PDS

The PDS requires two skills to be combined, technology skills and the practical skills of pattern cutting. With time, practice and experience using PDS the operator could become proficient at creating patterns without necessarily prior experience of learning the skills that manual work entails however, I believe it is essential that the operator has knowledge of the principles of creating a pattern. I say this because before I could access a particular function, I needed to know clearly what I wanted to do and what needed to be done, both these points being necessary in order to interpret and create the pattern pieces required.

My concern is unless the operator is manually trained in traditional pattern cutting there will not be a clear foundation of knowledge to underpin what is needed when using PDS. I am unsure of how much consideration would be taken regarding different fabric properties together with a background of how to visualise 3D construction of a 2D design. The subtle skills of interpretation are a fundamental process of pattern making and I am suggesting that these could become lost without tangibility when developing a 2D shape into a 3D form using computerisation.

From a personal perspective, I constantly wanted to create what I was doing on the screen through touch and manipulation to create the correct shape.

2) Comparative Dress Study

This exercise was to help me find my way round the technological functions of the PDS by creating pattern pieces for a simple dress. My first attempt at this was unsuccessful. I had previously digitised the dress block into the PDS and brought this up on the screen. As if manually pattern cutting, I studied the sketch to visualise the dress silhouette and consider the different steps to take to make the pattern. After several hours, I was unsuccessful in my attempt to make the pattern on PDS. This was because I did not know how to make happen what I needed to do by choosing the right functions. With further consideration, I decided to manually cut the pattern, noting what I did. I then asked the professional PDS pattern maker to make the dress pattern on the PDS while I watched and took notes. This way I could clarify comparisons between the two ways of working.

OBSERVATIONS OF WATCHING A PROFESSIONAL PDS USER

Watching the pattern maker using the PDS, it was immediately noticeable how necessary the use of measurements (not body measurements) were. As an example, when creating the new neck line manually, I drew a line that visually reflected the sketch and brought the shoulder point in slightly, again to reflect the sketch. On PDS, a measurement was made first on the centre front where to draw the new neck line from and likewise on the shoulder line which is a noticeable difference in the way of working. Measurements are calculated first before an action is taken creating a more mathematically calculated process.

The PDS requires the right function to be chosen and applied often involving a measurement check. To check if pattern pieces joined together on the seams involved a number of steps, for instance, to check the run of a smooth line, the operator would need to go into the correct function to rotate a pattern piece, a another to move the pattern piece and another to line the piece up in the correct

position, at the same time being aware of rotation angles. Working manually one piece gets picked up and placed with another in one move.

In my judgement, having carried out this exercise there is no right or wrong way or better way between these two methods of creating a pattern. What does seem to be of importance is the expertise. The PDS pattern maker and I both have the same number of years' experience in creating patterns and significantly when the pattern pieces for the dress were compared they were almost identical. I made up the two dress patterns into toiles to check how each had been interpreted from the sketch. The interpretation of the proportions can be seen on page 64. The fit of both dresses was the same due to the simplicity of the shape and because the dress patterns were both created from the same dress block. Working by hand, eye and touch, the pattern pieces were achieved as quickly as PDS.

I was trained in-house over a number of years in traditional pattern cutting skills; the pattern maker who contributed to this study received in-house training in traditional skills for two years before transferring to computerised pattern making. The expertise of this particular PDS pattern maker is grounded in her initial introduction to computerised pattern making in the early 1980s when PDS was first introduced into the industry. This meant as pattern making technology continually developed over past decades the pattern maker has been able work alongside evolving PDS technologies.

RIGHT: PDS operator's hand drawn dress sketch.
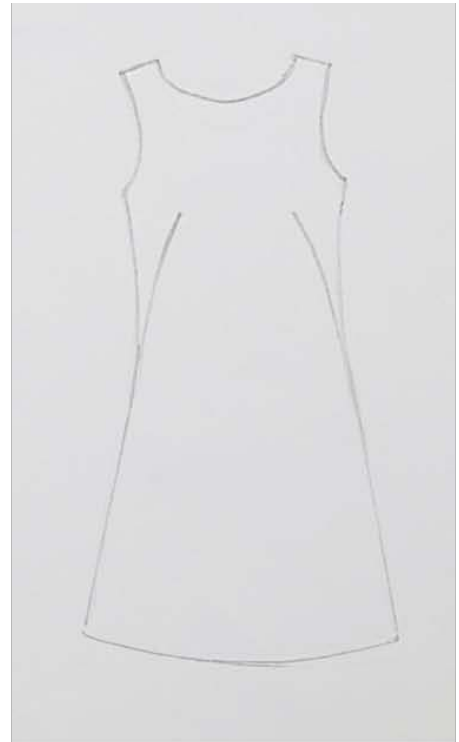
Below are 2 dress toiles.

LEFT: dress from PDS pattern

RIGHT: dress from manual pattern

PDS operator's sketch transposed onto dress toiles.

CONSIDERED QUESTIONS

- What amount of previous pattern knowledge is required?

It was apparent that without the knowledge of how to make a pattern manually it is impossible to operate and apply the appropriate functions on the PDS. Not only does the pattern maker need to know what to do and at what stage but also the pattern maker needs the ability to understand why something is being done and how this affects the pattern which determines construction of the garment. For example; using PDS to alter the position of a dart is so quick you cannot see the movement of the dart take place. Whilst the computerised function adds speed to making a pattern the danger can be that the operator moves the position of the dart without fully understanding how and why this will affect the pattern and the possible consequences of doing so. To appreciate the manipulating of a dart it is important to understand manual pattern cutting and to visually see how this changes the pattern and fit. A disadvantage for the future could be a lack of pattern construction knowledge and this would result in a drop of standard and creativity.

I was also aware when digitising a pattern into the storage data that the pattern maker needs an awareness of grading skills because the buttons used to digitise pattern pieces have a different code depending on the reference point on the pattern piece, the reference points refer to 'a grade point' and 'non grade point' when being digitised.

- What new skills need to be learnt?

The PDS operator needs to become accustomed to the appropriate technology skills to pattern-make efficiently. Mathematical skills are required and are predominate enabling the correct algorithms to be applied.

'When pattern makers use PDS, they select the quantity of gathers to add, the pattern maker must choose the quantity before seeing how the pattern looks' (Davis Burns & Bryant, 2007 p.263)

Quantity in the quote above refers to a calculated amount as opposed to feeling the particular fabric and discerning the amount by look and feel. This can still be the process but it becomes time consuming to convert it for the PDS. A disadvantage could be that a consistent amount of gathers would be used without a conscious decision that would take into account the silhouette and fabric of each design.

- How does the PDS affect the cognitive process of pattern making?

Using PDS is an analytical process, breaking down the procedure of each step. Rather than using the dexterity of fingers and hands to handle shapes and create lines there is a continual cognitive approach asking oneself 'what function do I need to use so I can perform A, B and C?'

'Using a mouse or stylus, pattern makers are able to swiftly add style details and make changes… speed has always been one of the defining features of the PDS enabling customers to shorten their product development cycles so they can get their products to market quicker' (Anderson, 2005 p.1)

I experienced the lack of physical movement with my arm, wrist, hand and fingers as the biggest adaptation because using the mouse involves no free movement. The lack of working tangibly is self-evident and made the computerised PDS more science based than a craft (discussed in Chapter 3). A disadvantage of the PDS could result in the pattern maker only learning through explicit knowledge, which is taught by theory, reading, verbal instruction and mimic, resulting in a possible restriction of practiced creativity.

- How does the PDS affect the ability to visualise what is required?

The PDS works on the principles of flat pattern drafting but with the pattern pieces not full scale. Looking at a flat screen and not being able to physically touch pattern pieces created a sense of detachment from the garment, the shapes become abstract and the process a matter of measurements rather than creative judgement.

> 'Visualisation difficulties can occur for pattern makers using PDS as there is a scale adjustment. The PDS shows the pattern pieces in a reduced scale and this can take some time to get used to….When working by hand these decisions are often based on what looks correct' (Davis Burns & Bryant, 2007 p.263)

Computers require us to think in new ways and use a different language. Whilst I appreciate that this new language serves the demands of twenty first century culture, I believe there needs to be an integration period where traditional manual skills are able to be translated in order for the younger generation to gain from the past. A disadvantage could be that the pattern maker while using an appropriate function connected with the language used may not fully understand what, why and how this function is needed and the affect it has on the finished garment.

ADVANTAGES OF USING PDS

(Based on my experience during this research and wider reading).

Accuracy/precision

PDS is extremely accurate, capable of working three points to the decimal point. Although the general amount needed is to two decimal points the PDS can be programmed accordingly.

- Uniformity

Consistency can be maintained as patterns, lay markers and grading can be sent from one factory to the other and programmed into automated machinery eliminating any human made deviances.

- Seam measurements

The PDS is capable of giving a line measurement at the press of a button which is extremely quick and more accurate than a tape measure. Seams can be added all around the circumference of a pattern piece as quickly.

- Tracing

Tracing off a shape from one piece to create another piece is often a requirement in pattern making. This is quick and accurate using the PDS. Pattern pieces for interlining and lining can be traced off and altered quickly and accurately.

- Transporting

The ability to send a complete pattern or individual pieces electronically to offshore factories is quick and easy especially when compared with the past when physical patterns had to be sent long distance on transport.

- Speed

The PDS enables pattern to be sent quickly between factories and design rooms. Speed to send patterns all over the world is a main advantage to PDS. Speed in regard to creating an initial pattern is subjective.

- Grading

Grading sets of patterns is a mathematical process and the PDS was first invented for this purpose as it is quick and accurate. Grading still requires knowledge and

understanding of the body form and how it changes over sizes. Without this information garments will not fit correctly.

- Storing

Large numbers of patterns and graded sets can be stored on the PDS which is physically space saving, particularly useful for small work areas.

- Alterations

Alterations can be made quickly on PDS changing corresponding pattern pieces at the same time. The alterations made can be sent electronically to the appropriate factories.

Overall the PDS is advantageous in the ability to produce the pattern pieces required that are standard, copied or traced from existing pieces. The PDS can 'add in' or 'take away' lines and shapes at speed from existing patterns and can cut out shapes via a plotter accurately and quickly.

DISADVANTAGES OF PDS

(Based on my experience during this research and wider reading).

- Lack of in-house training because not enough time may be given to a trainee pattern maker. A question that needs answering is who is doing the training for PDS?
- Lack of know-how and not realising why something happens and why something is done to a pattern piece along with consequences that may occur.

For example; a right sleeve is put into a left armhole. If this happens on a toile or sample it can be clearly seen what the consequences are, the sleeve hangs incorrectly. To amend the problem the sleeve has to be taken out of the armhole

by hand and in doing so the pattern cutter is able to learn from the mistake as they handle the fabric pieces, aware that balance notches do not match and the way the cloth lies is awkward, this can be felt. Through this manual process of correction an understanding can arise as to what and why something happens. Computerisation cannot teach this tacit knowledge.

'As a consequence, the technology often replaced human resources, resulting in less understanding and experience with the fundamentals of fit' (DesMarteau, 2003).

- Lack of toile making and handling of fabric, physical experimentation resulting in lack of creativity and interpretation skills.
- More maths based with specification sheets making the process more administrative based.

"Designs accommodate the computer and design is accommodating the skills available" (Technical director, male, early sixties, from North London, personal communication 25 October 2011).

SUMMARY

My argument is that pattern cutting for production has become a mathematical science rather than an artistic craft. Earlier I drew attention to explicit knowledge and tacit knowledge and from observing and operating the PDS, I have experienced the difference in these two forms of knowledge and how each is absorbed, one to produce a technologically created pattern, the other to manually create a pattern. Manual work uses the senses, particularly that of touch and sight which bring greater creativity to the process. Technologically producing a pattern requires cognitive and calculated thought. Both ways of working use senses and cognition but I believe each favours a prominent way of working. The outcome of this exercise is not conclusive; it is however, about change that has taken place and that change needs to be examined to help

maintain the important elements of the traditional ways of working to ensure a satisfactory standard of garments can be taken into the future.

As a professional pattern cutter I have noticed that the lack of creativity can often begin before it reaches the pattern cutter/maker. I refer to the wide use of specification sheets and the flat drawings or CAD illustrations as on page 74.

In the past when only manual pattern cutting existed

> "the pattern cutter and designer worked as a team, the pattern cutter did not presume to interpret the designer's sketch their way but became the designer's hands to bring to a reality the design, this is now seen as a luxury" (Designer, female, early fifties, London, personal communication, 15 February 2012).

From my personal experience as a manual pattern cutter and toilist, looking at a hand drawn sketch brings life into the garment because there is free movement that illustrates the fabric characteristics and the effect when worn. Hand drawn designs on models helps with the pattern cutter understanding the look required and the proportion details. A flat illustration is restricted in this way which makes it hard to understand what is wanted and therefore it is unsatisfactory when creating a pattern.

> "When having to produce work quickly it's easier to hand sketch, you can bring life into it, whilst giving an impression of the overall garment. One is able to pick out and emphasise the essence of the design. I think CAD kills things" (Designer, female, mid-fifties, London, personal communication, May 2012)

From: Horrockses Fashions Off-the-peg Style
in the '40s and '50s by Christine Boydell, 2010
p. 179

FLAT SKETCH PRODUCED BT COMPUTER AIDED DESIGN (CAD)

CHAPTER 3: DISCUSSIONS

3:1 CRAFTMANSHIP AND EXPERIENCE

An integral part of creating a garment pattern is being aware of the cloth that the finished garment will be produced in because the cloth helps determine how the pattern will be cut. The twenty first century offers many possibilities in the fashion design studio due to the vast array of new fabric technology producing different characteristics and textures. There are new light-detecting fibres, as shown by research carried out by the Massachusetts Institute of Technology (Thomson, 2009); synthetic fabric capable of changing colour, and fabric that behaves like a touch screen, devised in a project run by the Canada Research Council (Curry, 2012). There is a laser cutter in use at the University of Bedfordshire able to create beautiful and intricate cut-out work from lace effects to geometric design. This technology brings new challenges because underneath all the embellishment and effects there is still the requirement to manipulate and mould around a 3D form using manual skills for experimentation. This chapter explores what is meant by manual skills in the context of pattern cutting.

THE CRAFTSPERSON

According to the Collins English Dictionary (2003) the word *craft* means a skill or ability. It can also be an occupation or trade requiring special skill, especially that of manual dexterity. Therefore a *craftsperson* is someone who practises a craft; an artisan.

> 'Most craft practices are about using tools and manipulating material'
> (Wood, 2011)

When a pattern cutter is handling cloth it brings tangibility to the profession with importance placed upon texture, weight and drape to utilise the cloth appropriately. Whether the pattern cutter uses the technique of draping and manipulating cloth or flat pattern cuts, knowledge of cloth characteristics is

equally important. Dexterity of the hands to manipulate and an eye to judge proportion and detail indicates to me that manual pattern cutting is a craft.

To observe craftspeople at work I visited *Art in Action 2011*, a four day arts and crafts festival organised by the students of philosophy at the School of Economic Science. Whilst there I spoke to a number of manual workers skilled across a variety of different crafts to understand what is meant by creating a craft and to explore if there were similarities with that of creating garment patterns. Below are some comments I recorded:

FIGURE SCULPTOR (Male, late thirties)

> "I create a smaller version of the figure I have in mind so as to enter into the movement of the sculpture, it is important for me to feel and mould the wax"

> "All the while I am working on the small figure I am making decisions about what the figure represents, the shape, the balance, the proportions. These decisions change as I work with what I am creating; I am also understanding limitations and diversities of the figure"

GLASS BLOWER (Male, mid-forties)

> "As you watch the colours change in the heat you need to know how long to keep the glass in the fire"

> "Whilst rolling the rod you need to feel the rod under your hand, using the whole of the body to keep the rod rolling. You must understand the reaction of the glass when heated and when using the tongs at the same time"

I later spoke to a tapestry worker who had brought together traditional hand skills with technology but was still producing an individual piece of hand crafted work. She had this to say:

TAPESTRY WORKER (Female, mid-fifties)

"I use a digital camera to take photos of interest for the image of my tapestry; each pixel of the photo becomes a stitch. You can imagine the different colour shades across the pixels, sometimes I am working with 450 different colour threads"

"As I work I am feeling the tension of the weave, using my hands and fingers always making decisions, particularly to do with the right tone of colour thread and how to apply different threads; always asking what will happen"

It can be a slow process producing a product by hand and no two objects produced this way will be identical. It could be argued that it is precisely this 'no two are the same' that is the definition of hand work as each piece of work is individually made.

UPHOLSTERER (Male, late twenties)

"The first one is always the best. Make one and it is really good, you think how good you are, but when you try and reproduce another, the same, it never is"

"Something of the worker [regarding craftwork] is transferred into the piece of work which cannot be repeated as no two moments are the same"

(All personal communications, 12 August 2011)

When listening to the above craftspeople and others at the festival, key words and phrases were repeated in connection with producing their work such as; movement, feel, mould, embodiment, decision making, individual, to know why, to understand how, experience from doing, balance and proportion. These words describe a learning practice that I believe is hard to theorise due to the amount

of tacit knowledge involved. In my communications with colleagues in the garment industry who are traditional manual pattern cutters, these are also some of the words that they have used to describe their profession.

The bespoke tailors in London learn their craft through apprenticeships, experience and by observing others making individual garments. I was able to observe this craft when I visited Savile Row Tailor, Anderson and Sheppard for a day and observed the Master Cutter and the tailors in the workshop. The tailors had acquired their skills from years of experience. One person concentrated on producing one whole garment and each person specialised in a particular garment; a coat, a waistcoat or a pair of trousers. The trouser seamstress informed me that after two years' experience she could make one pair of trousers per day. A coat or jacket after a four year apprenticeship would take three days to complete and a waistcoat one day (Seamstress, female, late forties, London, personal communication, 4 October 2011).

This craftsmanship is reflected in the price of bespoke work. The master cutter at Anderson and Sheppard informed me that trousers sell at an average of £600 and a two piece suit an average price of £3,000. Not only time determines the price, but the quality of cloth, such as Vicuna at £1,000 per metre and embossed solid gold buttons at £200 each. Importance is also placed on the personal service which offers time in deciding colours and style, personal measurements and a minimum of three fittings during the process.

> 'Good service is an important key to success and people are loyal to craft businesses that are attentive to their needs, taking time to find out precisely what their customer wants and that's when service is a more decisive factor than price' (Bellano, 2011: cited in McDonald, 2011, p.3).

The above statements from craftspeople and the observations from the visit to a bespoke tailor demonstrate that a manual craft is time consuming, individual and requires practice and experience. Mass produced items are identical replicas of

one initial design and serve the demands of a great number of people and therefore need to be produced at speed to keep the costs down; a pair of denim jeans for instance takes fifteen minutes to make (*How jeans are made*, 2008) and can retail for £8.

A manual pattern cutter when working from an original design sketch is creating an original garment pattern. Together with a sample machinist a unique garment is produced; this appears to fit the definition of a craft. The pattern is then graded into different sizes and the graded patterns sent to a factory to be mass produced where replicas are made of the original design. It is no longer unique. I am suggesting that if the physical and tangible stage of creating an original pattern no longer exists and the pattern is processed on a computer screen using PDS technology, requiring different skills, the craftsmanship as defined in the above discussion is no longer present.

I am concerned that if the craftsmanship is taken out from the production of garments the whole procedure from an initial sketch through to the consumer buying the garment will become a technique of controlled, mathematical precision rather than an art that suggests creativity involving the imagination and dexterity. Interestingly Benicio Del Toro, actor and film producer describes Master Cutter Richard Anderson of a Savile Row tailors, as 'an artist' (Anderson, 2009).

I believe by integrating technology used in clothing manufacture with manual skills, a reasonable standard of garment can be produced and sold at a middle-of-the-road price creating a sense of individuality in the product and satisfaction for the worker. This could be made possible by maintaining the skill of toiling, the craftsmanship of creating the design and the pattern pieces. These pieces could then be digitised into the PDS enabling technology to be incorporated, providing speed and accuracy to further procedures necessary for the manufacturing process.

It is possible to bring together manual skills and technology, Gerber Silhouette 2000 is computer technology that combines these two skills and has been designed to enhance the skills, experience and capabilities of the pattern maker (Gerber 2012).

EXPERIENCE

The outcome of the two practical studies showed that experience is one component to creating a good design interpretation. Experience alone appears not to have been enough as the study illustrated with blouse A, skill was also required. However the outcome also demonstrated that these two components were reliant on the training received.

At the beginning of 2011, *Drapers,* a weekly journal for the fashion business, announced that they were launching a campaign called Save our Skills (SOS). The aim of the campaign is to challenge the Government and relevant organisations to support grass-root skills training and apprenticeship schemes in garment and textile manufacturing. Below are some of the comments from the February and March 2011 issues of *Drapers* that discussed these issues;

'Even if we (UK) manufacture overseas, we need to retain technical skills in this country if we are to manage overseas growth' (Maurice Bennett, fashion retail investor. Drapers, February 25, p.6).

'I believe the lack of good courses, coupled with no manufacturing industry in the UK, has seriously degraded the technical knowledge students have when they come to us' (Deborah Sharpe, fabric development technologist for Marks and Spencer. Drapers, February 25, p.8).

Despite the closure of De Montfort University's Fashion Technology course in 2010, Julie King, Head of Fashion says that they are constantly increasing the skills provision in the fashion department. However this has been commented upon by Jan Frost, the director of Jan Frost Jerseywear, who is saddened by the

above closure as she feels it is acting regardless of the needs of the fashion industry which she argues is saturated with design students who 'woefully lack the skills needed to create a commercially viable product' (Drapers, February 25, p.8).

'With our staff currently averaging an age of fifty or over, we are trying to encourage younger people to come into the business to learn and feed off the older generation to take over one day and prevent this trade from dying out completely' (Jack Masters, manufacturers in UK for the past 24 years. Drapers, March 11, p.10).

River Island chief executive Ben Lewis expressed concern at the skill gap factories face from a lack of trained machinists and pattern cutters. (Drapers, March 25, p.4).

In order to gather further views and opinions on the topic of maintaining skilled workers in the UK, particularly pattern cutters/makers, a questionnaire was compiled consisting of questions related to exploring the relevance of manual skills in a technological environment.

Below is a summary of answers collated from that questionnaire which was sent to four interviewees. The four interviewees that took part are all senior pattern cutters, either manually skilled, computerised or both. Additional positions held or once held by the interviewees are: technical director, production director, head of pattern department and toilist. Their individual experiences range from twenty three to fifty five years in the industry.

A completed questionnaire from each individual can be seen in Appendix D, page 103.

3:2 SUMMARIES OF THE ANSWERS RECEIVED FROM THE QUESTIONNAIRE

1)

A unanimous **yes** *was answered by all interviewees when asked if future computerised pattern makers should be initially trained in traditional manual skills. The reasons given were;*

So as to have familiarity with different processes in the making of a garment

To know the suitability of cloth to design and to adapt the pattern accordingly

To feel the pattern piece shapes and know what they look like

A pattern in full size enables the pattern cutter to see in 'real life'

Alterations and fit can be understood as they are corrected

With a toile made, refinements can be made of the interpretation

Working in paper helps appreciation of 3D shapes

Draping and modelling on a 3D form cannot be replicated on a flat screen

To gain an 'eye' for proportion

2)

Over the past few decades what has been the biggest change you have experienced or seen in the clothing industry regarding the making of patterns and manufacture? In your opinion what impact has this had?

The lack of toiles

Wider use of blocks, standardising shapes

Computerisation

Volume in mass production numbers

Garment industry has become globalised

The impact this has had;

Lack of individuality (more uniformity)

Less creative artistry, 'no soul' and 'lack of flair'

Lack of manufacture in UK

'Bad' fit as this is not done at the initial stage

Loss of communication between the different process stages

Lack of training in UK for pattern cutters

Lack of consideration to interpretation

More speed

Opportunities to learn has been lost

Longer delivery times

Drop in standards due to approval being given rather than miss a deadline

Time saving on grading

Cheaper production therefore cheaper clothes

3)

In order to meet the demands of speed, larger numbers and a lower priced garment, clothing manufacture and pattern making has gone overseas. What do you feel has been gained within the industry because of this and what has been lost?

Gained;

Cheaper garments

Wider variety of intricate work due to cheaper labour

Lost;

Traditional pattern cutters

Drop in standards

Pattern cutters are hindered

Interpretation of sketches

Workers with skills in the UK

Good fit

Delivery times, they have increased and less reliable

Knowledge, as there is nowhere to train

Time and cost is first over quality and fit

4)

Do you think the role of the pattern cutter has changed over recent years and if so how? How do you see the role of the pattern cutter in the future?

A pattern cutters role in the UK is more about supplying specific information

They do examination of the samples

Need to make clear alteration instructions for overseas (no longer do them themselves)

Need to be computer literate for patterns and paperwork

Do more administrative work

Do not work directly with the designer

More checking of samples and more quality control

Have to translate what is needed from different sources

Need to move from manual working to computerisation

When space was given for an open discussion and comments these issues were expressed;

No young blood will come into the industry if there is no industry (jobs) to go into in UK.

There is an importance and the need of maintaining tactile work.

Education is needed.

There is the attitude from agencies that 'the computer does the job', therefore pattern cutters/makers wages are not so high which is demeaning to the pattern cutter/maker and their importance.

The pendulum could swing the other way if there is an increase for 'something different' from the consumer.

CHAPTER 4: LOOKING FORWARD AND CONCLUSION

4:1 A LOOK AT THE FUTURE: Pattern Cutting and Manufacture

It is arguable that technology skills are essential for the future of the garment industry with new technologies continuing to develop. For example, there are pattern design systems (PDS), computer aided design (CAD), 3D body scanning and advanced image processing techniques for garment visualisation, including customer virtual try-on. Technology is even making it possible to spray on clothes (Hibbert, 2005), a juxtaposition with the growing popularity among young people to hand customise garments by adding buttons, ribbons and other embellishments, as is my experience working with university students wanting to maintain hand skills. Wendy Gardiner, book author and editor of *Sewing World Magazine,* believes the beginning of an upturn in hand craft is evident (McQuillan, 2006). Gardiner adds how she has seen an increase in the demand for fabrics and customising clothes made popular by TV shows such as stylist Gok Wan (Smith, 2008). Although hand skills are desirable, as I have experienced working with students, due to cheap imported clothing and the scarcity of time to learn, manual skills are hindered. 'Dressmaking skills have all but been wiped out by the downgrading of sewing at school' (McQuillan, 2006) and as indicated from the questionnaire response the opportunities to train in the industry as a pattern cutter are few.

See Appendix E for past dressmaking skills in education, page 118.

As new technologies together with hand skills enter the future there is awareness towards manufacturing in the UK with a possible return to the 'Made in Britain' label. Mary Portas, a retail marketing consultant, drew attention to this issue with her recent TV show during March 2012 and commented that while the UK is unlikely to match the vast volume of manufacture in China, the UK can manufacture clothing and indeed does on a smaller scale (*Mary's Bottom Line,* 2012). Portas acknowledges that the middle market in the UK is lost with very

cheap at one end such as Primark and the luxury of bespoke at the other. Lord Wolfson, chief executive of Next clothing, spoke at the re-launch of the UK Fashion & Textile Association and took a different approach to manufacturing in the UK:

> 'British clothing firms should concentrate on design and development and leave the manufacturing process to China. UK factories could never hope to compete with the standards, speed and prices offered by China and should not waste time trying, the value is not behind the sewing machine' (Drapers, March 23 2012 p.5).

The experienced seamstress or tailor in the workshops of bespoke tailors can complete a welt pocket in ten minutes (Seamstress, female, late forties, London, personal communication 4 October 2011). How can this compete with an equally well executed welt pocket that takes fifteen seconds on state of the art automated machinery (Bxuysal5166, 2012)? It is this speed of manufacture that enables large British superstores to offer full school uniform for £4.50, impossible for UK manufacture, making Lord Wolfson's argument plausible if price is the only important factor to buying a garment.

Sir Philip Green, owner of Arcadia, is looking for ways to help train young people as sewing machinists and pattern cutters in order to produce more clothing in the UK. One way he hopes to do this is by emulating the success of the Fashion Retail Academy and creating a Manufacturing Academy (Felsted, 2012), 'We need as much focus on the next generation of production talent as there has been on new design talent' Green said (cited in Cartner-Morley, 2012). James Petrie, manager of the fashion and textiles sector at skills agency Skillset is in agreement with this as he comments 'We have an oversupply of design graduates without technical, operations and manufacturing skills' (Drapers, March 18 2011 p.8).

If factories and manufacture came back to the UK, it could encourage the next generation to learn the skills of manual pattern cutting/making and this skill could be recognised as the craft it is, an integral part of the fashion industry.

Mike Hannaford, senior manager and technical designer said when interviewed:

> 'I spent most of the last 20 years as a pattern maker. The greatest need in technical design is the knowledge of pattern making and probably garment construction' (DesMarteau, 2003).

In the last decade British brand Burberry has set up a scheme that teaches pattern-making and weaving to school leavers linked to an NVQ qualification. 'We have a number of initiatives in place to foster talent. These include engaging with our local communities promoting skills and expertise in craftsmanship' (Drapers, March 11 2011 p.2). Another innovation is the non-profit organisation Fashion Enter which has an apprenticeship scheme to help the industry with skilled workers whilst providing a pattern cutting, toiling, sampling and production service (Drapers, March 18 2011). Sir Alan Sugar echoed these aspirations speaking on the topic of bringing manufacturing back to the UK when debated in the House of Lords. He suggested 'incubator' factories could be developed by turning empty buildings into an area fitted with machines where skilled workers can be employed such as pattern cutters, machinists, technicians and sample makers (Sugar 2011). I offer the suggestion that existing fashion courses throughout the UK include more technical skills or adapt courses to offer extra training in alternative skills that can be applied to patterns, construction and production. Sandra Kotei, course director at the Fashion Tailoring Academy comments, 'You need to know technical skills and details to underpin design knowledge and creativity' (Drapers 2011, 13 May p.6).

Whilst writing, a colleague traditionally trained as a manual pattern cutter and who is a competent user of the Gerber PDS, has been asked to reduce his working week from 5 days to 3 days. The company director's reason for this

action is to employ pattern cutters overseas to reduce costs. Wage costs are rising in China making it less competitive however they are still low, averaging £1 per hour compared with the minimum UK wage of little more than £6 per hour (*The town taking on China*, 2012). With the increased price of cotton over the past year, in some cases 175%, plus the rise of overseas labour costs and transport fuel costs, high street retail clothing is rising in price (Neate, 2011) indicating that overseas production is no longer so competitive.

It would appear the message for the future is confusing; there is a lack of trained, skilled pattern cutters/makers due to employment overseas but there is a drive to train technical workers in the UK. There is the campaign to bring manufacturing back to the UK but there is a lack of traditional skills being taught to a younger generation. I suggest a possible way forward for the UK could be to train skilled technical workers and these workers take their expertise overseas to train overseas pattern cutters/makers to ensure a high creative standard.

4:2 LOOKING ONE STEP FURTHER

Exploring the possibilities of traditional pattern cutting skills being maintained in the industry comes into sharp contradiction when looking further into the future. Imagine the need to no longer flatten a 3D body shape into a 2D paper pattern before recreating the 3D garment but simply creating around the body a 3D skin (Delamore, 2012). Does the future hold the demise of the flat 2D pattern eliminating the manual pattern cutter altogether? Could 3D forms be created directly on to a digitised scanned body and a 3D printer produce a garment for the human form? Fabric may no longer be woven fibres but particles formed via microelectronics and biochemistry. The field of nanotechnology could be the new fabrics of the future and sewing will no longer exist, no longer a necessary means of holding two pieces of fabric together (Quinn, 2012). This look at one step further into the future brings together science and craftsmanship, both digital and craft practices.

Designers using 3D technology can view a design in 3D on the computer screen before the pattern has been made and a sample sewn. There is also the technology now to replicate fabric on screen which means a physical garment sample need not be made and 'advances in computer technology will allow the 3D virtual garment to be transferred into a 2D pattern' (Davis Burns & Bryant, 2007, p.270). At present there is still the need for mass production as the majority of people live within a financial budget and live a life-style that requires functional, practical and comfortable day to day clothing. But mass production is changing with the introduction of mass customisation so the role of the pattern cutter's skill and craftsmanship is evolving, not obsolete.

4:3 CONCLUSION

This thesis began by asking whether traditional manual pattern cutting skills are relevant in a technological environment, and whether, if relevant, how these skills can be maintained and integrated with the new technologies of the twenty first century.

In order to answer this question, several data production tasks were carried out. I arranged for patterns and garments to be made and evaluated. I experienced first-hand how to use the Gerber Pattern Design System (PDS) and to critique the process by comparing my own manual work with an experienced PDS user. A questionnaire was sent to four interviewees to gather opinions from others in the garment industry. Included and integrated within these tasks were insights from my own observations and interactions with various craftspeople at work and a visit to a bespoke tailor on London's Savile Row.

From a personal perspective, this research has been a journey of discovery; I have gained knowledge and respect for the technologies available for pattern making and body scanning. I have found Gerber PDS capable of producing patterns quickly and accurately and able to be sent to offshore factories in the time it takes to press a button, which has a significant impact on the management of mass produced garments. This research has shown that the creating of patterns has changed over time, and through the practical studies carried out, a better understanding of what contributes to producing a satisfactory pattern has been demonstrated by looking at the effect of training, skills and experience.

I have attempted to describe the craft that lies behind the creativity of producing 2D patterns for 3D garments; the ability to interpret, to understand fabric characteristics and knowledge of construction. I have asserted that these skills are necessary to transform a sketch/illustration into a physical garment pleasing to the designer. By exploring the changes towards pattern cutting resulting from

new technologies it has been possible to identify factors that have contributed to the loss of manual skills; geographical distance, lack of personal face to face communication, the lack of a physical sample garment and the lack of availability for in-house training. I have argued that these factors have contributed to a fragmented team of skilled workers and in particular the breakdown of creative discussion that would have once taken place between sample machinist and pattern cutter. The individual feedbacks from the questionnaire have shown that others in the industry realise the changing role of the pattern cutter and are aware of the lack of a working relationship between the designer and the pattern cutter which resulted in a creative understanding of how best to interpret a design.

> "Without the communication between designer, pattern cutter and sample machinist there will continue to be deskilling of certain workers" (PDS pattern maker, female, mid-forties, Hertfordshire UK, personal communication 2012).

> 'A team approach among pattern maker, cutter and sample sewer is an advantage as alternatives and problems can be discussed and a specific process if needed'. (Davis Burns & Bryant, 2007 p.267)

A more familiar expectation in the present day is for the pattern maker to receive a flat working drawing produced using CAD, together with a specification sheet informing the pattern maker of the measurements required, resulting in information being applied to pattern pieces rather than a sketch being skilfully interpreted.

This research has demonstrated that traditional manual pattern cutting is still used in bespoke workmanship and in some design houses but pattern cutting for the ready-to-wear industry has moved to computerised pattern making. This is also demonstrated by recent job vacancies that are advertised requesting that pattern cutters are able to use Gerber PDS (or other similar system).

Studying the data gathered from the two practical studies suggests training together with experience in using the skills acquired, is the foundation to creating a successful garment pattern. However what the practical studies have also shown, is that there are human factors involved, as pattern cutter A demonstrated. Pattern cutter A had training and experience and yet failed to provide a satisfactory pattern.

To transfer manual skills to the computer is not necessarily straight forward as I discovered through personal experience of learning to use PDS, but having technology skills and then learning to use the PDS with little previous experience as a manual pattern cutter, is possibly easier to grasp. Without enough pattern cutting knowledge a pattern made on PDS is more likely to be unsatisfactory as was the case with pattern maker B. Pattern maker B uses PDS but lacks training and the knowledge of manual skills and interpretation as demonstrated by the results of blouse B.

Pattern maker C has experience using PDS and was trained in-house by a pattern cutter who taught the principles of manual cutting. Pattern cutter D is manually trained and experienced in PDS and manual work. Both patterns created by pattern cutter/makers C and D resulted in similar size and shape pattern pieces creating a satisfactory interpretation of the design with a comfortable fit.

The results of practical studies 1 and 2 are inconclusive because of the human factors that can arise and the differing standards from one individual to another. However this research has indicated that it is important for the pattern cutter/maker to understand the characteristics of fabric, because this influences how to create an appropriate pattern; to understand the importance of body form and how measurements relate to size for a good fit; and to understand and interpret proportion. Finally the knowledge of construction needs to be applied when creating patterns, not only to interpret the image the designer illustrates

but in order to make a pattern appropriate for manufacture when working for the mass market.

I conclude that the difference between digitised and manual work is the physical touch of fabric that encourages creativity and experimentation when manipulating shape around a 3D body form. Geographical distance has limited this experimentation with fabric and shape for the pattern maker together with lack of face to face communication, hindering creative development and discussion.

> 'The nineteenth century tailor needed to consider the same body measurement data as we do today to achieve successful fit, took minimal linear data and filled in through great skill and experience; he draped to capture surface, shape and volume. Ultimately, consumer satisfaction with fit will depend upon our ability to combine the knowledge and skills of the 19th century tailor or dressmaker with the strengths of manufacturing and information technology. The continued development and conservation of both our technological and intellectual resources is critical' (Bye, LaBat, DeLong 2006 P.76)

Computerised pattern making is based currently upon flat pattern techniques; however it is possible for the creativity of pattern cutting to be integrated with PDS by maintaining the ability of manual skills to interpret the design through draping and toiling. The toile can be transferred into a 2D pattern and the pattern digitised into the storage data on PDS ready to be graded or sent overseas.

RECOMMENDATIONS

Regarding training of technical skills and the maintaining of these skills manufacturing academies, apprenticeship schemes and incubator factories have

been mentioned. From my experience of working with undergraduate students on fashion design courses and with the information I have gained throughout this research I want to put forward an alternative suggestion for training future pattern cutters/makers and sample makers.

There are many colleges and universities that offer fashion design courses in the UK and at the end of three years study it is usual for the degree students to produce a mini collection for the catwalk. Could existing courses be divided into two strands? One strand to concentrate on pattern construction manual and computerised, traditional and creative skills, together with garment construction; and the other strand to concentrate on design, styling and marketing. With the students working together but specialising on one course they could each enhance the other's skills, emulating the industrial world of fashion and lifting the standards of all the disciplines involved. Emphasis could be placed on teamwork as designers and pattern creators with machinists collaborate and bring a collection together.

When learning to use PDS, I believe it requires an instructor who is knowledgeable and familiar with traditional pattern cutting principles and understanding. It also requires training time and supervision in order to use it advantageously and effectively and provision needs to be made for this in higher education. The present lack of in-house training highlights the amount of knowledge that risks being lost for future generations, placing a greater need for more specialised and extensive training in higher education fashion courses. Tacit knowledge requires time, practice and experience. Without that availability knowledge risks remaining explicit and theorised only.

Further research possibilities

- An investigation involving research into learning processes in the context of creative work. What is the learning process that happens when using dexterity and manual skills?

- To research a greater number of manufacturers and to travel abroad to the factories that mass produce in order to interview pattern cutters who have come from a different culture and learning environment. To explore training opportunities.

- To explore further into the skills of pattern cutters/makers with greater depth by carrying out larger practical studies over a greater demographic and investigate further into technological pattern development systems.

- An investigation into the changes that need to take place in higher education fashion courses in order to train students to a high standard in both design and technical skills of equal importance and how manufacture fits in with this.

APPENDICES

British Standard 3666 : 1982, Size Designation of Women's Wear

In the UK women's clothing size is traditionally indicated by numbers. In 1982 the British Standards Institute produced a standard set of sizes from 8 to 32 quoted in centimetres.

Unfortunately, there is no requirement for manufacturers or stores to use the British Standard resulting in a range of size indications for the same size of garment from different sellers. A new standard BS EN 13402 is intended to replace this system with one in which actual measurements are used, however this is not yet in common use.

This table shows the sizes as given by the British Standard.

Size	Hips from		To		Bust from		to	
	cm	in	cm	in	cm	in	cm	in
8	83	32.7	87	34.3	78	30.7	82	32.3
10	87	34.3	91	35.8	82	32.3	86	33.9
12	91	35.8	95	37.4	86	33.9	90	35.4
14	95	37.4	99	39.0	90	35.4	94	37.0
16	100	39.4	104	40.9	95	37.4	99	39.0
18	105	41.3	109	42.9	100	39.4	104	40.9
20	110	43.3	114	44.9	105	41.3	109	42.9
22	115	45.3	119	46.9	110	43.3	114	44.9
24	120	47.2	124	48.8	115	45.3	119	46.9
26	125	49.2	129	50.8	120	47.2	124	48.8
28	130	51.2	134	52.8	125	49.2	129	50.8
30	135	53.1	139	54.7	130	51.2	134	52.8
32	140	55.1	144	56.7	135	53.1	139	54.7

From; www.tradingstandards.gov.uk/towerhamlets/size.htm   29.06.2012

RETAIL HIGH STREET SIZE CHARTS

SIZE: INCHES	6	8	10	12	14	16	18	20	22	24	26	28	30
Bust (inches)	31	32	34	36	38	40	42	44	46	49	51	54	56
Waist (inches)	25	26	27	29	31	33	35	37	40	42	44	47	49
Hips (inches)	35	35	37	39	41	43	45	47	50	52	54	57	59

MARKS AND SPENCER GENERAL WOMEN'S SIZING

Size: CENTIMETRES	6	8	10	12	14	16	18	20	22	24	26	28	30
Bust (cm)	80	82	86	91	96	101	106	112	118	124	130	136	142
Waist (cm)	63	65	69	74	79	84	89	95	101	107	113	119	125
Hips (cm)	88	90	94	99	104	109	114	120	126	132	138	144	150

MONSOON WOMEN'S SIZING

		Bust (cm)	Waist (cm)	Mid Hip (cm)	Hips (cm)
8	S (Small)	82	61.5	81	87
10		87	66.5	86	92
12	M (Medium)	92	71.5	91	97
14		97	76.5	96	102
16	L (Large)	102	81.5	101	107
18		107	86.5	106	112
20	XL (Extra Large)	112	93.5	113	119
22		117	100.5	120	126

NEW LOOK WOMEN'S SIZING

UK SIZE	6		8		10		12		14		16		18	
UK SIZE	/		S/M		S/M		S/M		M/L		M/L		/	
EUROPEAN SIZE	34		36		38		40		42		44		46	
U.S.A SIZE	2		4		6		8		10		12		14	
TO FIT	cm	ins	cm	ins	cm	ins	cm	ins	cm	ins	cm	ins	cm	ins
BUST	80	30.5	84	33	88	34.5	93	36.5	98	38.5	104	41	112	44
WAIST	62	24.5	68	26.5	70	27.5	75	29.5	80	31.5	87	34	94	37
LOWER HIP	86	34	90	35.5	94	37	99	39	104	41	110	43.5	117	46

ALLSAINTS WOMEN'S SIZING

M/MENTS	XS	XS	S	S	M	M
UK SIZE	4	6	8	10	12	14
BUST CM	76cm	78.5cm	81cm	86cm	91cm	96cm
BUST INCHES	30	31	32	34	36	38
WAIST CM	58.5cm	61cm	63.5cm	68.5cm	73.5cm	78.5cm
WAIST INCHES	23	24	25	27	29	31
HIP CM	84cm	86.5cm	89cm	94cm	99cm	104cm
HIP INCHES	33	34	35	37	39	41
HIP CM	84cm	86.5cm	89cm	94cm	99cm	104cm

FRENCH CONNECTION WOMEN'S SIZING

UK SIZE	6	8	10	12	14	16	18	20
BUST INCHES	32"	33"	34"	36"	38"	40"	42"	44"
CM	81cm	84cm	86cm	91cm	96cm	101cm	106.5cm	112cm
WAIST INHES	25.5"	26.5"	27.5"	29.5"	31.5"	33.5"	35.5"	37.5"
CM	65cm	67cm	70cm	75cm	80cm	85cm	90cm	95cm
HIP INCHES	35.5"	36.5"	37.5"	39.5"	41.5"	43.5"	45.5"	47.5"
CM	90cm	93cm	95cm	100cm	105cm	110cm	115cm	120.5cm

All the above size charts were taken from the appropriate retail company websites, 1st October 2012.

APPENDIX C

MANUAL PATTERN CUTTING PROCESS OF DRESS

FRONT

1. Roll paper out and trace around front block
2. Determine centre front length and shorten and right angle off
3. Draw new neck and armhole shapes
4. Flare side seam out as sketch and take in slightly at the waist
5. Leave waist dart amount in without darting (not fitted)
6. Determine the line for new dart from side seam , hip level
7. Close old bust dart and open the new
8. Trace around the front draft pattern and add seam allowances
9. Cut out and fold dart in order to get the angle at the side seam correct.

BACK

1. Trace around the back block
2. Determine new neck and armhole shapes
3. Place side seams together to check the flare is at same angle
4. Take in slightly at the waist (as front)
5. Check shoulder seams match and side seams and the lines run smoothly together
6. Create the keyhole shape at the centre back
7. Add seam allowances
8. Cut out
9. Trace off the front and back facings

Time taken: one hour. All the notches are put in as you go along as the seams are matched. The front and back pattern pieces are worked on separately, the front first.

COMPUTERISED PATTERN MAKING PROCESS OF DRESS

FRONT AND BACK

1. Enter the PDS and bring on to the screen the dress block
2. Determine the centre front length and bring up the hemline on front and back together
3. Rotate to move pieces upright
4. Create the front neck
5. Create the back neck then create the front armhole and the back
6. Put shoulders together to check the shapes
7. Take in on back waist
8. Flare out centre back seam
9. Flare out the back side seam
10. Prepare new front dart
11. Bring in the front waist
12. Move dart
13. Add the flare on front side seam as far as the new dart
14. Curve new dart to lose a little more from the front waist
15. Check measurements
16. Put in notches
17. Put side seams together to curve the hem
18. Add seams on front and back
19. Work the new front dart so the angle is correct
20. Add hem allowance
21. Add keyhole shape at the centre back
22. Digitise the facings from the front and back body
23. Send to plotter to cut out

Time taken: one and half hours. Need to 'save' after each function in case of any corrections needed. Need to use rotate function each time you move a pattern piece.

The plotter took extra time to program due to a technical problem and time was taken up getting the correct angle at the side seam for the new dart. The front and back pattern pieces were worked on at the same time.

APPENDIX D

Below are 4 questions that are all related to pattern cutting in the garment industry. I would value your own views, opinions and experiences to help me with research I am doing concerning the advantages and disadvantages of both manual pattern cutting and computerised pattern making.

1) Do you think it is important to train future pattern cutters with traditional manual skills before learning computerised pattern cutting?

YES……..**X**   NO……….   UNSURE……..

Please give a reason for your answer

Initially yes, knowledge of basic pattern cutting theory is essential in order to appreciate how this can be adapted to make patterns by computer. Working manually in paper or card helps appreciate the 3 dimensional body shapes and it also helps gain an eye for size and proportion. (Although these can also be understood by sticking a computer printout together) Draping and modelling on a stand cannot be replicated on a 2-D computer program.

2) Over the past few decades what has been the biggest change you have experienced or seen in the clothing industry regarding the making of patterns and manufacture? In your opinion what impact has this had?

The development/improvement of computer programs for pattern cutting and grading. This has enabled a more globalised industry

where more of the development process, as well as manufacturing, has moved overseas. Having patterns computerised (either digitised or created on PC) means they can be emailed anywhere in the world, i.e. to the cheapest manufacturing base. To keep up with competition where/what one company goes/does others have to follow in order to survive. Therefore all companies must use computers to keep up with each other and be able to react quickly to changing markets.

This competition has led to suppliers also using cheaper overseas workers to do their pattern cutting via sketches/instructions that are emailed to them. In this process there is a major loss in communications, no conversation takes place between designer and pattern cutter, so the sketch doesn't get interpreted correctly. Pattern cutters in Asia do not understand the body shape of a British person, so the patterns they make are often not right and don't fit well.

This has resulted in there are very few factories in the UK and many companies which don't have a sample making unit either, so there are fewer opportunities for young pattern cutters to learn any skills.

Where companies do use pattern cutters in the UK, there is no opportunity to discuss construction methods with a sample machinist, so the development process doesn't happen as it used to, there is no relay of information back and forward. A designer or pattern cutter doesn't learn from their mistake or learn a better way of working. Much communication which used to take place between designer & pattern cutter, pattern cutter & machinist, has been lost.

The time lines are longer with manufacturing overseas and in order to meet delivery schedules the retailer is being forced into accepting incorrect garments. It can take a couple of weeks to receive a sample from overseas, rather than a couple of days if it were made in this country. If it takes 3 samples to get the fit right, due to ineffective communications between 2 continents, this could mean missing a

deadline. So a technologist may have to approve something even though it's not correct.

3) In order to meet the demands of speed, larger numbers and a lower priced garment, clothing manufacture and pattern making has gone overseas. What do you feel has been gained within the industry because of this and what has been lost?

Gained – cheaper prices or more intricate, detailed designs at a reasonable price . . . leading to more competition and innovative designs. .. Leading to the demise of C&A and such like, and the rise of Zara, Mango etc . . . .

Lost – knowledge. Without a manufacturing base in this country there is nowhere for young people to train to gain the necessary experience or knowledge of the industry. There are many technologists who don't have the knowledge of what a good fitting garment looks like, and who don't know how fit problems should be corrected. Companies employ people who don't have the experience yet they aren't prepared to invest in training them either. And there may not be the facilities for training them.

Time and cost are of prime importance resulting in quality and fit being compromised

4) Do you think the role of the pattern cutter has changed over recent years and if so how? How do you see the role of the pattern cutter in the future?

A pattern cutter has had to become computer literate over the last 10 years. Not just in the actual pattern cutting bit of the job but also the paperwork bit. Most companies expect sketches and make instructions to be done on a spread sheet so that the information is

accessible and shareable electronically. So they have taken on more of the admin role than in the past. They have also taken on more of a QC role in checking the samples when they come from overseas.

They need to have clairvoyant skills to understand the fit comments made by the unskilled technologists at the retailer end.

A good pattern cutter in the future will need to be the bionic women - super fast worker, with excellent eyesight and hearing to see and hear what's happening on the other side of the world where the sample is being made.

Please use the space below to express any further comments that you feel are important to mention in regard to the future of pattern cutting and manufacture in the clothing industry.

The role of agencies has become crucial, not many companies advertise themselves. Agencies tell employers that seeing as "the computer does the job" for them they don't have to pay such high wages for skilled pattern cutters. This attitude demeans the importance of the pattern cutter, and they are not held in such esteem as they used to be.

Every industry has had to adapt to computerisation and the wider global market, within the fashion industry the lack of good management skills has meant that the transfer of knowledge from one country to another hasn't happened as it should have. It needs skilled people from this country to travel overseas and impart their knowledge to others.

THANK YOU SO MUCH FOR TAKING THE TIME TO HELP ME IN MY RESEARCH BY ANSWERING THE QUESTIONS.

Finally, could I please ask you to state your occupation and the number of years you have worked in the clothing industry and circle your age.

JOB DESCRIPTION……Pattern cutter on Gerber

HOW MANY YEARS IN THE INDUSTRY…23!!!!!!!!

AGE   25 – 30   31- 40   <u>41-50</u>   51 - 60   61+

INTERVIEWEE 2

Below are 4 questions that are all related to pattern cutting in the garment industry. I would value your own views, opinions and experiences to help me with research I am doing concerning the advantages and disadvantages of both manual pattern cutting and computerised pattern making.

1) Do you think it is important to train future pattern cutters with traditional manual skills before learning computerised pattern cutting?

YES….X….   NO……….   UNSURE……..

Please give a reason for your answer

This is a hard one to answer, the reason being I was brought up in an age were computers were hardly used in our trade, except for a form of marker making. So the way I was taught was to make patterns in card or paper so you could get the feel of the shapes and the pattern pieces as you cut them out. I have also worked on the computer making patterns, which at first I found difficult to get used too, but because of my training I found it became easier to use because I knew what the pattern pieces should look like. I'm not sure how people are being trained as pattern cutters these days, but I would hope they are taught to flat pattern cut first and Toile before moving onto making pattern on the computer.

2) Over the past few decades what has been the biggest change you have experienced or seen in the clothing industry regarding the making of patterns and manufacture? In your opinion what impact has this had?

The most obvious change is the amount of garments now made abroad, before only mainly soft separates were made overseas now all outerwear is made there as well. This also includes a lot of the patterns are made in their factories; this has led to decline in manufacturing and pattern cutting being done in this country.

3) In order to meet the demands of speed, larger numbers and a lower priced garment, clothing manufacture and pattern making has gone overseas. What do you feel has been gained within the industry because of this and what has been lost?

The only gain I can see is that we (most people) can afford cheaper garments, although so of these garments are not to a high standard, but you do get what you pay for. What we have lost is the workers with the skills in this trade, such as machinist, tailors, cutters etc. I am not sure about pattern cutters, because if you search though the internet there are still a large amount of pattern cutters around. Whether there standard and quality is good enough is a thing I can't tell you

4) Do you think the role of the pattern cutter has changed over recent years and if so how? How do you see the role of the pattern cutter in the future?

I don't think the role has changed only the ways of making patterns has, but this is all part of technology. I believe it is down to manufacturing companies to help bring this trade back to this country and only then will you encourage people back into training as a pattern cutting, because if there are no jobs for people with these skills what is the point in training them, they will look for trade or job that they can work in, so there will be no young blood coming into it

Please use the space below to express any further comments that you feel are important to mention in regard to the future of pattern cutting and manufacture in the clothing industry.

THANK YOU SO MUCH FOR TAKING THE TIME TO HELP ME IN MY RESEARCH BY ANSWERING THE QUESTIONS.

Finally, could I please ask you to state your occupation and the number of years you have worked in the clothing industry and circle your age.

JOB DESCRIPTION……

Senior Pattern Cutter, Toilist

HOW MANY YEARS IN THE INDUSTRY…….

AGE   25 – 30   31- 40   **41-50**   51 - 60   61+

INTERVIEWEE 3

Below are 4 questions that are all related to pattern cutting in the garment industry. I would value your own views, opinions and experiences to help me with research I am doing concerning the advantages and disadvantages of both manual pattern cutting and computerised pattern making.

1) Do you think it is important to train future pattern cutters with traditional manual skills before learning computerised pattern cutting?

YES……**X…**   NO………   UNSURE……..

Please give a reason for your answer

The foundation of creating new patterns must start with manual skills This is the only way to educate future pattern cutters.
An essential part of making a paper pattern is to create a 'block' or 'template' from which to create a construction pattern which will form the foundation of new pattern.
The block is purely the basic silhouette without style details.
The construction pattern interprets the style details, then a toile needs to be made.
This enables the pattern cutter to see in 'real life' what the final garment may look like.
It is at these stage alterations to fit and refinements to achieve interpretation can be made.
This I feel is the most rewarding stage.
Any alterations are transferred to the construction.
Before making the initial paper pattern which should have all required components such as linings, fusible pieces & any markers required.
Don't forget a detail working sketch to also assist in sample manufacture.

Order :
1. Create block pattern
2. Create construction pattern
3. Create toile & adjust
4. Adjust construction
5. Create paper pattern for initial sample

2) Over the past few decades what has been the biggest change you have experienced or seen in the clothing industry regarding the making of patterns and manufacture? In your opinion what impact has this had?

Making computer patterns without initially working manually on a style has removed the artistic side of pattern making, it has no soul. Therefore many styles become bland and uniform.
Also without a library of perfect fit blocks to start new creations, much wasted time & money is spent with alterations to fit, size & balance

Also computer grading although a very accurate & time saving tool, sometime no thought is given to aesthetics on larger / small sizing

Modern garments are streamlined to mass production at a price & the area that suffers most is in the pressing during the making process & final pressing.
Also some internal components are not up to the required standard

3) In order to meet the demands of speed, larger numbers and a lower priced garment, clothing manufacture and pattern making has gone overseas. What do you feel has been gained within the industry because of this and what has been lost?

Frankly nothing has been gained, as we have lost the skill sets that were in place in Europe prior to Far East production, hardly any of these skills have been handed over to the current generation & also there is not a desire from them to learn them.

In the U.K. most of the 'old school' are no longer with us.

4) Do you think the role of the pattern cutter has changed over recent years and if so how? How do you see the role of the pattern cutter in the future?

The role has changed from manual to computer generation almost totally.

The use of computers will continue to be the future but some tactile work must be done at creation stage to bring styling to life.

The advantage of computer patterning is obvious.

Manual created patterns need to be digitised or scanned in before alterations / grading

Nest grading by computer is relatively simple, quick & is very accurate

Copy patterns and creating variations are a great time saver

Plotting patterns / lay plans can be done repeatedly

Electronic transfers of patterns / lay plans can be received instantly worldwide.

Please use the space below to express any further comments that you feel are important to mention in regard to the future of pattern cutting and manufacture in the clothing industry.

Education

THANK YOU SO MUCH FOR TAKING THE TIME TO HELP ME IN MY RESEARCH BY ANSWERING THE QUESTIONS.

Finally, could I please ask you to state your occupation and the number of years you have worked in the clothing industry and circle your age.

JOB DESCRIPTIONS……Pattern cutter, Designer, Production director, Technical director (Ladies Outerwear)

HOW MANY YEARS IN THE INDUSTRY…….50

AGE   25 – 30   31- 40   41-50   51 - 60   **61+**

INTERVIEWEE 4

Below are 4 questions that are all related to pattern cutting in the garment industry. I would value your own views, opinions and experiences to help me with research I am doing concerning the advantages and disadvantages of both manual pattern cutting and computerised pattern making.

1) Do you think it is important to train future pattern cutters with traditional manual skills before learning computerised pattern cutting?

YES…*yes……*   NO……….   UNSURE……..

Please give a reason for your answer

Familiarity with the different processes in the making of a garment would enable a pattern cutter to avoid cuts that would prove problematic in production.
Also be better able to judge the suitability of a pattern to the selection of cloth and be able to adapt a pattern to the amounts necessary for ease.

2) Over the past few decades what has been the biggest change you have experienced or seen in the clothing industry regarding the making of patterns and manufacture? In your opinion what impact has this had?

Chronologically; 1) Moving away from making patterns from toiles

        2) Wide use of blocks

        3) Computerisation

These changes have increased standardisation resulting in;

1) *More uniformity*
2) *Less variety*
3) *Increased accuracy*
4) *More speed but less "flair"*

3) In order to meet the demands of speed, larger numbers and a lower priced garment, clothing manufacture and pattern making has gone overseas. What do you feel has been gained within the industry because of this and what has been lost?

The industry has been able to source the cheapest market but delivery times are increased and less reliable. Standards however may still be good.

Pattern cutters abroad are not able to observe daily changes in trends which are selling in the shops so are unable to interpret sketches in the latest idiom. Regular visits to the west by eastern pattern cutters would improve this but might prove expensive.

4) Do you think the role of the pattern cutter has changed over recent years and if so how? How do you see the role of the pattern cutter in the future?

Patterns will probably continue to be made aboard so the role of the pattern cutter in UK will be to provide very specific information and maintain rigorous examination of submission samples. After which pattern alteration instructions must be very clear.

Please use the space below to express any further comments that you feel are important to mention in regard to the future of pattern cutting and manufacture in the clothing industry.

Customers will always be looking for "something different" therefore boutiques will increase and with them the demand for 'pattern-cutter-designers'.

Thus the pendulum will begin to swing back!

THANK YOU SO MUCH FOR TAKING THE TIME TO HELP ME IN MY RESEARCH BY ANSWERING THE QUESTIONS.

Finally, could I please ask you to state your occupation and the number of years you have worked in the clothing industry and circle your age.

JOB DESCRIPTION…… *Many different from Technical Director to Head of Pattern Cutting Department.*

HOW MANY YEARS IN THE INDUSTRY……. 55

AGE   25 – 30   31- 40   41-50   51 - 60   **61+**

APPENDIX E

Answer 4 questions of which one can be taken from section A and three from section B. you are advised to spend about forty minutes in answering the question from section A.

You may, if you wish, use the silhouette provided on page 3 of this question paper to produce an outline on your script for fashion sketches. If you use it place it under a single sheet of paper and outline it in pencil.

Illustrate your answers by means of clear, bold diagrams wherever possible. You may use a needle and thread and scrap paper to help in making drawings of stitches.

SECTION A

1
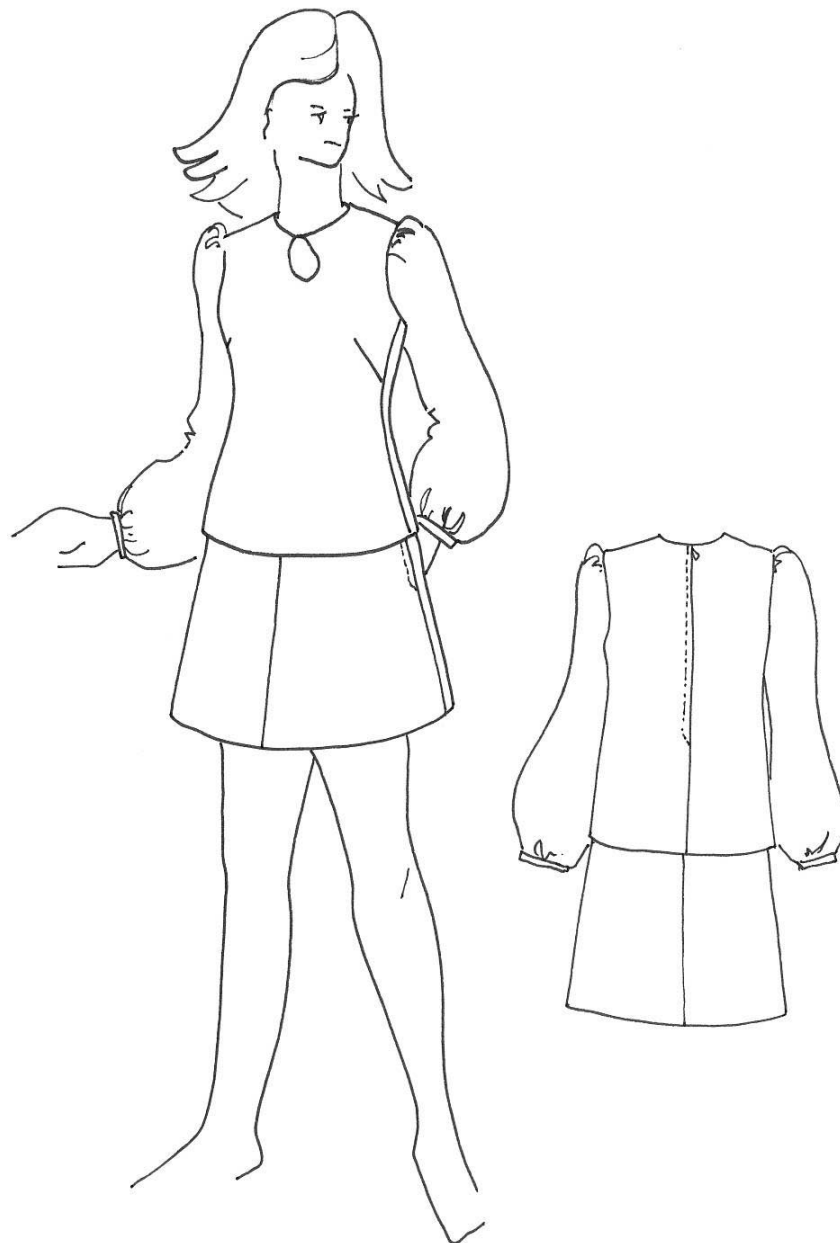
(a) Describe the features of this blouse and skirt.

(b) Name and describe a suitable type of fabric for:

(i)   The blouse
(ii)   The skirt

(c) Give reasons for your choice of each of these fabrics.

(i)

(ii)

(d) Name three suitable fastenings for the front neckline of the blouse

(i)

(ii)

(iii)

(e) Cut out the pattern pieces for the blouse which are shown on the next page

(i)   On the diagram which represents 36in (92cm) wide fabric, use these pieces to plan an economical layout for the blouse, allowing for the cutting of the crossway strips required to finish the wrist edges. Draw round the pieces and indicate by a dotted line the position of the crossway strips.

(ii)   On the layout insert and label the pattern markings you would find on each piece of the pattern.
(iii)   Estimate how much fabric would be required for making the blouse. Write your answer on page 3.

SCALE 1:8

FOLD
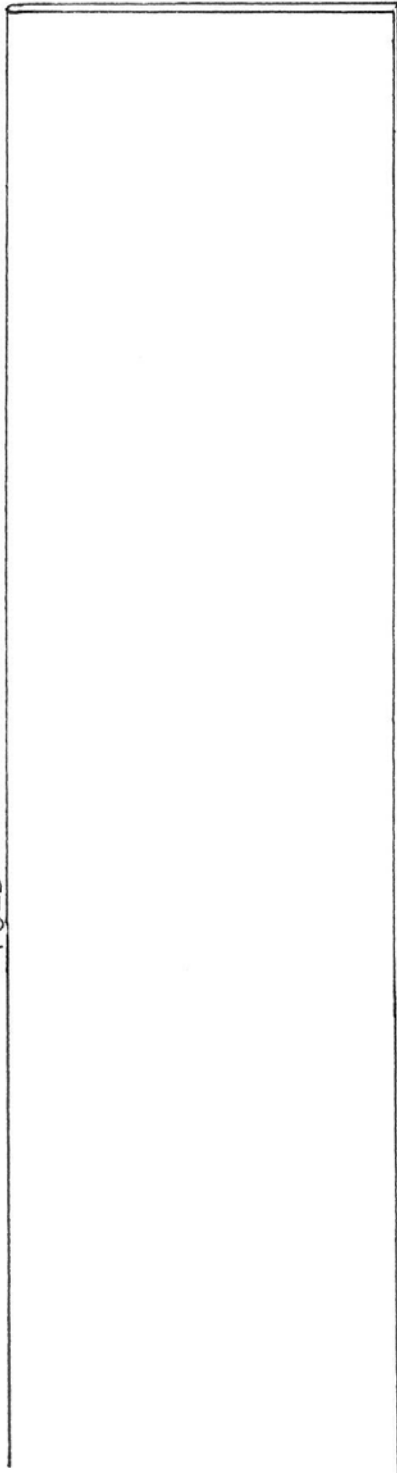
SELVEDGES
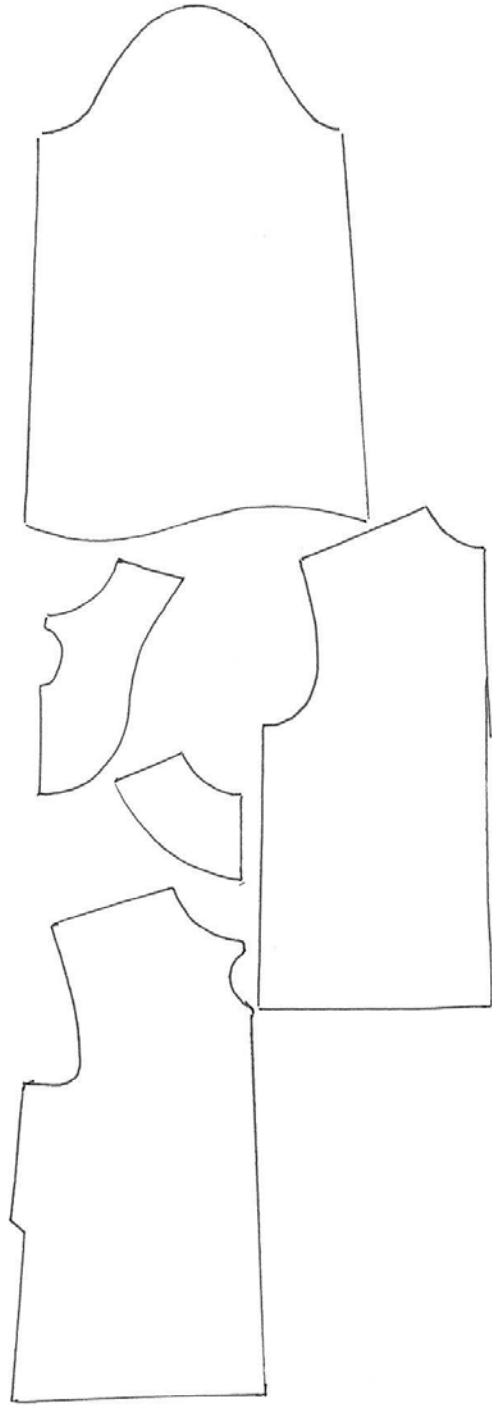
Amount of fabric required;

120

2 Rayon is a versatile fibre.

    (a) State the raw materials from which it is made.

    (b) Describe briefly one method of manufacturing rayon fabric from the raw materials.

    (c) Name one type of rayon fabric and say why it is suitable for clothing.

    (d) Sketch the front and back views of a dress featuring tucks which you could make using this fabric. Label the style details clearly.

    (e) Show by clearly labelled diagrams and notes how to work the tucks.

3 You are going camping on a weekend during the Easter holiday, travelling part of the way by public transport.

    (a) Sketch the front and back views of the outfit you would wear for travelling. Label the style features clearly.

    (b) Make a list of all the items of clothing you would pack in your rack-sack.

    (c) Giving reasons for your choice, state the fabrics from which your outfit and two items of clothing in your rack-sack are made (choose different fabrics).

    (d) Suggest suitable items which would be included in a repair outfit for holiday purposes. Using clearly labelled diagrams show how to darn a hedge-tear in one of your outer garments.

<div align="center">

SECTION B

</div>

4 A school skirt could be made from <u>terylene and worsted</u>, have <u>permanent inverted pleats</u>, the <u>zip concealed</u> and the waist finished with a <u>petersham band</u>.

    (a) Explain fully each of the terms underlined, using clearly labelled diagrams where suitable.

    (b) What attention should be given to this skirt during the holidays in preparation for wear next term?

5 You are going to make an unlined wool jersey tunic.

    (a) How can you ensure that your sewing machine will produce good results when stitching this fabric?

    (b) During the making up of the tunic the following types of machine stitching will be used;
        Stay stitching   top stitching   under stitching   zig-zag stitching

Explain where and why you would use each type of stitching.

   (c) Where would hand sewing be used when making this tunic? Name the stitches and give reasons for their use.

6 An open seam is used on a variety of fabrics.

    (a) How does the fabric influence your choice of method of neatening an open seam?

    (b) Show by means of clearly labelled diagrams a suitable and different type of neatening for an open seam at:

        (i) The shoulder seam of a glazed cotton dress

        (ii) The side seam of an unlined wool tweed pinafore dress

        (iii) The curved armhole seam of a brushed Acrilan magyar dressing gown

    (c) For each of the above give full instructions for pressing the completed seams.

7 You have borrowed a friends pattern for a pair of flared trousers and find that the waist is 2in (5cm) too wide and the length is 3in (7.5cm) too long.

    (a) Show by clearly labelled diagrams how you would adjust the pattern to fit yourself.

    (b) Give the order of work for making up the trousers after cutting out.

    (c) Which points would you check when fitting the trousers before machining?

8
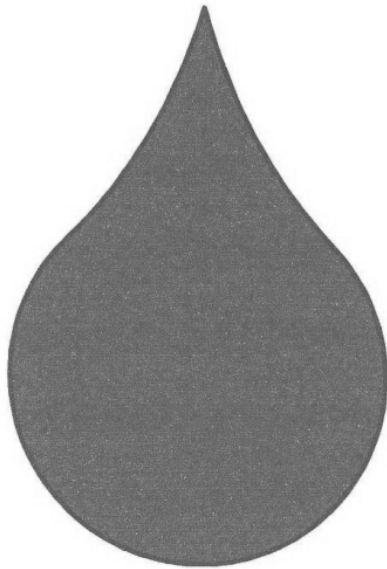
Tear-drop motif

    (a) Show how this tear-drop motif could be used as a basis of design for either applique or surface stitchery on a child's pinafore.

    (b) Give clearly labelled diagrams and brief notes for working a section of the design to include at least one motif.

    (c) Name the types of threads and state the colour(s) you would use to work the design.

9 You are going to make a pair of brushed nylon pyjamas for winter wear. The top is to have a lace-trimmed yoke.

- (a) Describe the fabric and say why it is suitable for night wear.
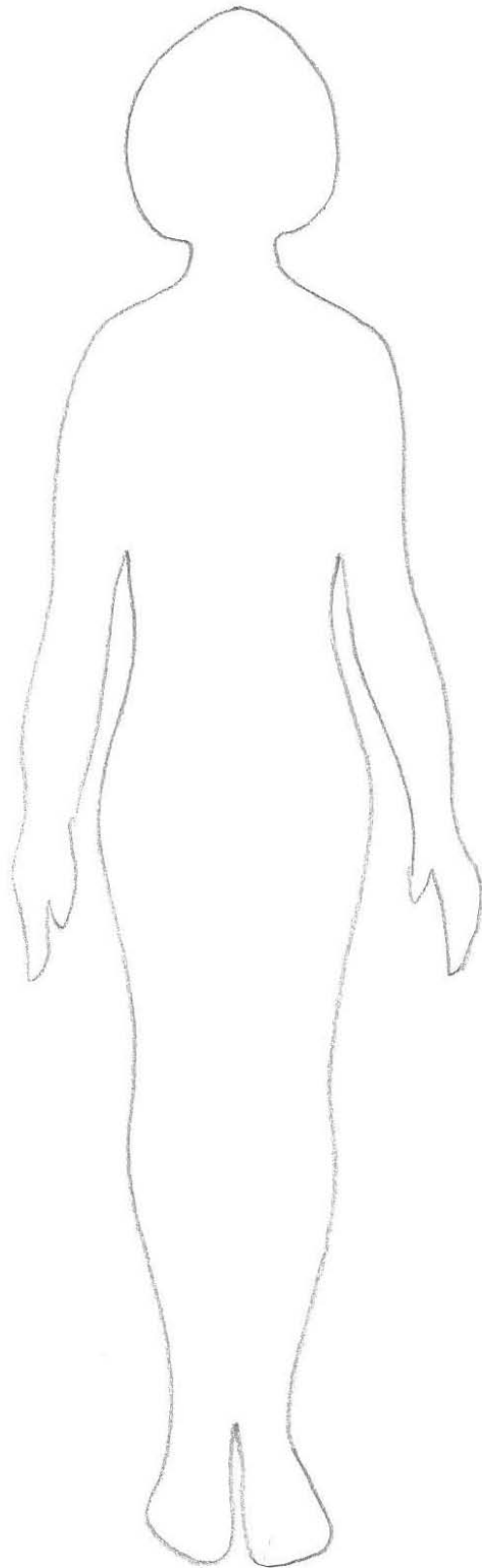- (b) Explain fully how to:
    Attach the lace between the yoke and the bodice and complete the yoke seam.
    Make a casing for elastic at the top of the trouser
    Estimate the amount of the elastic required
    Join the elastic after insertion

Illustrate your answer with clearly labelled diagrams.

Researcher's own copy of 1972 'O' Level examination paper

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GLOSSARY

Balance……Often refers to the relationship between the front and the back of a garment; that the garment hangs well and that each garment piece sits in harmony with the next.

Bespoke……made to individual order; custom-made; traditionally, completely sewn by hand.

Block pattern……Template of basic body shape to a standard size used to work from.

Dart……A way of sewing away surplus cloth when moulding around a body shape. The dart shape graduates to nothing at the fullest part of the body i.e. the bust and hip

Draping……working with cloth on the mannequin/stand by manipulating to what is required.

Facing……Part of a garment; a piece of cloth that is used to neaten a raw edges by seaming together with the main body, often used on neck, armhole and open edges.

Gathers…..surplus cloth that give fullness to a garment when sewn into an indicated smaller area.

Grading……The process of making different sizes of the same pattern design.

Grain……The direction of the threads in a woven fabric; warp = the lengthwise grain, weft = the crosswise grain.

Interlining……An inner lining sewn or fused to the wrong side of the fabric or between layers to give structure or to help hold a shape.

Internal markings……marks on the pattern that instruct the machinist such as pocket position or dart.

Interpretation…..the skill of translating a design sketch into a reality.

Made-to-measure……A garment made according to a customer's measurements modified from a block and cut and made in a factory.

Nap……Surface of a fabric where the fibres have been brushed in one direction e.g. velvet

Nett……Without seam allowance; the line on which the machinist will sew (seam line); block patterns are 'nett'.

Notch……a small cut in the perimeter of the pattern that indicates a guide to sewing or an instruction.

Overlocking……Stitching that is sewn over the edge or edges of one or two layers of fabric; usually used to neaten seams or join jersey.

Pattern……A shape or number of shapes in two dimension that when cut out in fabric and joined together forms a garment.

Pile……A fabric that has a surface made of upright ends e.g. fur.

Raddle……A tool with handle that has at one end a small wheel with spikes often referred to as a tracing wheel.

Seam allowance……the amount of fabric that extends past the nett (seam) line. Can vary in depth according to fabric or the function of the seam.

Stack grading……A technique of making different pattern sizes, the sizes are stacked on top of each other and cut together. A fast and accurate, manual grading process.

Swatch……A small piece of fabric that is shown as a sample.

Toile……Mock-up garment in cheaper fabric to check fit and design proportions of a design before a final pattern is made.

Toilist……A person that is skilled at producing toiles; A pattern producer that drapes rather than works flat.

Tolerance……An amount of extra measurement in the pattern that allows for a good fitting.

Vicuna……A South American endangered goat whose hair is woven into highest quality wool fabric, extremely rare.

Visualisation……Ability to make visible something imagined.

Wale……A ridge forming a texture on a woven fabric e.g. corduroy

Welt……Type of pocket often found on men's trousers and jackets. Made from a horizontal band of fabric attached to the garment and covers the opening to the pocket.

Yoke……Part of a garment shaped to enhance the fit; separate piece sewn on to the main body of a garment; often found on the back of jeans, over the top hip and across the shoulders especially across the back of a man's shirt.

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