Towards a New Design Strategy: A Visual and Cultural Analysis of Small-Scale Pattern on Clothing

Hilary Carlisle

A thesis submitted in partial fulfilment of the requirements of The Nottingham Trent University for the degree of Doctor of Philosophy

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Abstract

The aim of this research has been to develop a new design strategy for printed textile design which holds resonance both socially and technologically within our increasingly pluralistic culture. This has been realised by offering a fusion of theoretical and practice-based work for investigation. In particular, the research is concerned with the role pattern on clothing plays in gender perception. The major achievements of the project are the production of a viable working model which demonstrates a method by which theoretical investigation can inform and inspire practice-based work, and the application of this method in the production of software and design examples which demonstrate innovative possibilities for contemporary textile design by examining and manipulating the gendered features identified through the historical and theoretical investigation of traditional patterns on clothing.

The theoretical research examines culturally hierarchical dualities such as mind-body, culture-nature and order-chaos. From this, a notional, and oppositional, set of gendered visual features of pattern was constructed. This set was then explored through the use of archival and contemporary data for the periods 1967 – 1973 and 1997 – 2002. The analysis of the data, which allows for discrepancy and contradiction in individual samples, provides suggestions for both continuity and change in contemporary gender identities and design.

The practice has been concerned with developing a strategy which considers inventive textile design through two parallel strands: the ongoing re-evaluation of gender roles and identities in contemporary culture, as explored in the theoretical work; and the re-evaluation of commercially printed textiles resulting, in part, from technological advances in ink-jet printing.

A unique software prototype has been developed which constructs non-repeating textile patterns that could be transferred directly from computer onto fabric. The parameters used by the software are a culmination of the theoretical, social and commercial considerations explored throughout this thesis. The resultant design examples illustrate the potential of the design strategy by revealing patterns which, through the exploration and reinterpretation of gendered polarities, offer innovation without alienation.

Acknowledgements

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Foreword

This thesis is accompanied by a CD-ROM; however, it is not necessary to access the information on the disk in order to read it. Where appropriate, the disk has been referred to in the text as a source of extra information.

Included on the CD-ROM are: an executable version of the software prototype designed for this research project; a *Microsoft Access* database containing survey data; a *Microsoft Access* database containing catalogue archive information; a *Microsoft PowerPoint* presentation of all the images included in the thesis; a *Microsoft PowerPoint* presentation demonstrating one technique used to construct images; and the entire thesis in *Adobe Acrobat* format.

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Introduction

The original aims of this research were as follows:

- To examine the visual qualities and socio-cultural issues associated with small-scale patterns used for clothing.
- To seek socio-cultural explanations for historical variations in small-scale pattern design used for clothing.
- To explore the potential of a new design strategy for printed fashion textiles, using the information from above in conjunction with computer randomising techniques.
- To produce textile designs for clothing which embrace the philosophical and creative concepts of the project.

Four personal factors influenced the direction in which the project progressed. They were: the importance of gender in pattern design on textiles for clothing; an enthusiasm for computer aided design; the ambition of promoting the status of textiles as a design discipline; and the desire to produce contemporaneously relevant textile designs for clothing. These inspirations, together with the aims, were refined into the following hypothesis:

> It is possible to construct a design strategy, using a combination of cultural and visual analysis, which, acknowledging the current ambivalence towards traditional gender roles, supports the creation of relevant and credible contemporary printed patterns for clothing.

The philosophy of the research combined a theoretical and practical approach to the analysis of visual and cultural qualities of pattern on clothing. This analysis was then applied to the development of printed textile patterns which do not conform to the usual repeating structures associated with commercially available printed fabric. The most significant outcomes of the research will be of benefit to practitioners, theorists and commercial ventures. For theorists and practitioners, the design strategy, with its method of drawing from theoretical and visual approaches, may be used as a model for future design strategies, or simply borrowed from as an aid to the development of further research. For practitioners and commercial ventures, the design examples and prototype software indicate future possibilities for commercially printed textile design, and lend themselves to application in diverse future directions.

The specific focus of this research considers the desirability of, and gender implications for, pattern on clothing in Britain, and delivers a personal strategy for both the

continuation of, and innovation in, pattern on textiles in the twenty-first century. This is done by first identifying a set of gendered pattern features through theoretical and visual analysis. This set of features permits the assessment of connotations of masculinity and femininity in both historical and contemporary pattern design. Throughout the thesis, a strategy has developed in which each chapter, or section, of the research leads on to the next. Each development was documented in light of the knowledge that the research practice was concurrently developing techniques of producing non-repeating textile patterns, and that technological advances implied that, theoretically, these design experiments could be printed directly onto fabric via ink-jet printer. The project used this information to examine the relative merits of non-repeating textile patterns and the factors which would contribute to their suitability in the mainstream market. The culmination of the project is a series of design examples endowed with the qualities discussed throughout the thesis.

At the start of the research in 1997 there were several significant factors which drove my enthusiasm for this work. The socio-cultural theorising of textile design was extremely rare. Works which did exist tended to concentrate on ethnic textiles and non-Western cultures. Historical and anthropological accounts were provided, rather than social ones. Also, at this time, pattern on clothing had become scarce in mainstream clothing. This seemed to be more than a passing trend; it appeared that pattern had been on a slow decline since the mid 1970s. From a personal perspective, I was passionate about the use of computers to aid textile design. Textile design was embracing CAD much slower than other design disciplines. In the commercial arena many buyers were reluctant to consider computer aided designs due to the technical difficulties in printing them, and in education there seemed to be an equal reluctance to incorporate significant amounts of CAD into the teaching programmes.

The final reason for my desire to begin this investigation was stimulated through an interest in gender studies which originated during my Master's research at Central St Martins. My investigation into the use of clothes in persona construction was aided by feminist psychoanalytical theory. All the other factors I have highlighted can be related to gender. Textile design is a predominantly female-driven discipline, which could provide an historical account for the reticence to study it in a serious theoretical manner. This concept will be explored more fully in Chapter One. The predominance of women who work in textile education and industries may also be seen as a contributory factor in the slow uptake of computer technology in textile design; there has been a widely acknowledged historical reluctance by women to engage with technology. During the twentieth century pattern has become largely associated with

women and femininity, for reasons which will also be explored in Chapter One. The relative absence of pattern on clothing noted at the start of this research may therefore be associated with changing gender roles.

In the intervening period, many new developments and progressions have been made in relation to the above points. Fashion and textile design have started to be studied in a more academic and theoretical way. The success of publications such as the journal *Fashion Theory*, and the recent announcement by Berg publishers of a new journal entitled *Textile: The Journal of Cloth & Culture*[1] shows a new willingness to explore textiles in a multi-disciplinary way. Pattern on clothing has reappeared on the catwalk and the high street in profusion, instigating a reassessment of its social and gender implications. Computers are now widely used in textile design, both commercially and academically. The proliferation of fabric ink-jet printing bureaus has enabled students and designers to successfully produce designs on fabric at a less than extortionate cost. Rather than invalidating or pre-empting the research, these developments have given additional justification for the research, and allowed it to progress in some ways more rapidly than could have initially been anticipated.

Before outlining the content of the chapters of this thesis I would like to clarify some of the general points and expressions used throughout the text. This is essentially a study of British pattern on clothing. Where American and European information has been referenced, it is usually to indicate influences from these countries. It is also essentially a study of printed patterns on textiles. In the cases where examples given may be knitted or woven, they are shown as an indication of more general styles worn. In all other cases, unless otherwise specified, 'pattern' may be considered to imply 'printed pattern'. This terminology is used for brevity and convenience.

In some instances the words 'fashion' and 'clothing' are used interchangeably, but it should be stressed that this is a discussion of 'lived clothing', i.e. the garments which a majority of young people buy and wear, rather than fashion in the sense of the extremes of couture, the catwalk and much fashion advertising. It is concerned with the mainstream; sub-cultural dress and issues of sexuality have not been focused upon, but are indicated where influential to the main text. It should also be noted that the 'lived clothing' under discussion is that of a fashionable nature. The market being considered is fairly youthful and within a price-range that would now be referred to as the 'high street'.

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[1] The inaugural volume will be published in 2003

This study analyses pattern on clothing in the full knowledge that it is a single factor in the overall construction of appearance. It does not attempt to inflate pattern's overall importance by attributing closed or fixed meanings to its features or styles. Rather, as the purpose of the research has been to devise a relevant design strategy for contemporary design, the analysis draws upon links, similarities, discrepancies and contradictions in order to highlight future possibilities. The strength of this work is in its identification and utilisation of significant gendered features in pattern design, while at the same time recognising that there are many other factors and forces which influence popular pattern, but which are outside the realm of this study.

Finally, it will become apparent through the following chapter descriptions, and indeed the chapters themselves, that the research has consisted of a continuing negotiation through a series of diverse theoretical and practical methods. While the lack of precedents in this type of research meant there was no existing model to draw on, this ultimately proved to be a asset to the project, enabling me to navigate across disciplines without feeling limited by existing boundaries. As the research has concluded, I realise that it is the intersections and conjunctures between these diverse methods which has led the research towards new knowledge in the form of an innovative design strategy, software prototype and design examples.

Chapter One introduces the theoretical issues of the project. Lack of previous theoretical discourse in this area is discussed, from fashion, clothing and textile design perspectives. Explanations for the lack of research are discussed in the three overlapping areas of context, triviality and femininity. Counterarguments are then presented to these explanations, using appropriate historical and theoretical research. From this initial grounding, the chapter moves on to a discussion of theoretical approaches which progress from the general to the specific as they move through sections on communication and meaning, gender, gender and clothing and gender in pattern design. At each stage, theories and their usefulness and implications to this project are discussed. In brief terms, these sections begin by questioning the ways in which clothes can be considered to communicate, and how these ways may be meaningfully studied. Within this first section the structuralist notion of polarities is introduced. This is then explored more fully with reference to the hierarchical valuing of polarities utilised in the work of many feminist authors. These concepts are then related to the work of fashion theorists who have considered gender in their analysis of clothing. Finally, the culmination of these ideas is to identify particular visual features of pattern on clothing which can be considered to be oppositional, i.e. a member of an either/or category, and also gendered. This identification provides a set of features

which can then be utilised in the following chapters.

A case study of pattern on clothing between 1967 and 1973 is given in Chapter Two. This chapter begins by giving some background as to why this period was chosen. Consideration is given to the challenges faced by the historical partitioning of previous studies and archives into the separate areas of fashion or textiles. The social upheaval and the concurrent profusion of patterned garments made the late sixties and early seventies a particularly relevant period of investigation, and this was supplemented by the more prosaic factors of its relative proximity to contemporary culture and the availability of data. An account of the social history of the period is then given, with particular reference to events and movements which reflected changing social and gender roles. Sexual liberation and optimism are two of the key concepts considered at the start of the period, while feminism and economic uncertainty are concepts considered at the end of the period. The social history is followed by a discussion of clothing in the period, with particular reference to gender and pattern. As in the case of the social history, this fashion history highlights the specific features which relate to the project, rather than attempting a complete analysis of fashion over the period. After a discussion of the archives visited and data collected, the chapter finishes by analysing examples of pattern on clothing with particular reference to the gendered polarities identified in Chapter One. This analysis identifies masculine and feminine signifiers in the pattern of the period and considers how gender difference was maintained throughout a time when connotations of femininity were common in men's clothing.

Chapter Three provides a contemporary review of pattern on clothing which complements the case study of Chapter Two. The period examined in this chapter is 1997 to 2002. In dealing with the present day, a slightly different approach was required. Rather than a formal contextualised social history, an analysis of commentary from the mainstream press has been provided. The issues of education, popular science, masculinity and femininity are discussed separately, as they are topics which have been widely discussed in the media since 1997, and they are particularly relevant to the understanding of contemporary gender roles. These views are then correlated with recent images of pattern on clothing, and the accompanying fashion commentary to give an analysis of the similarities and differences in representations of gender through pattern since the case study. There have been numerous changes in the clothing market since the period of the case study, which have lead to an increased plurality in styles and the blurring of the boundary between designer and high street fashion. Another boundary which is now considerably blurred is that of appropriate

clothing for a particular age group. As a result of these changes, the mail order catalogues themselves are less specific in their categories, and have to compete with a plethora of high street shops, designer outlets, and, increasingly, the internet. The contemporary analysis of clothing needed to reflect that and hence a selection of fashion spreads and commentary from the broadsheet press and mainstream fashion magazines were analysed, rather than data from mail order catalogues. In many cases, it is the commentary in conjunction with the pattern which proves most revealing. The examples given indicate ambivalence towards femininity, both in terms of its desirability for the contemporary woman, and in its definition.

Further contemporary analysis is undertaken in Chapter Four, though this chapter moves away from the direct investigation of pattern on clothing to consider other issues which are relevant to the design work. The discussion in this chapter forms the bridge between the theoretical and practical aspects of the research. As will be explored more fully in Chapter Five, the aim of the practice was to create design examples which, while acknowledging the existing gendered polarities in pattern on clothing, sought to democratise their effects. By considering the pattern features as continua rather than polarities, ambivalence may be achieved in which gendered differences are displayed without the hierarchical associations they usually connote. The practical aspect of the project provides visual examples of patterns which, through the removal of the restriction of repeating structure, do not conform to the usual rules of commercially printed fabric.

With this in mind, I begin Chapter Four by addressing our human fascination with pattern and repetition which has led to speculation over its nature and qualities by artists, designers, theoreticians and scientists. Following this, specific examples of scientific and artistic imagery which displays non-repeating qualities will be discussed in order to indicate the possibilities and realities of working with computers to generate imagery over which the creator does not retain full control. Scientific examples include fractals and Penrose tiles, both of which were discovered or created for scientific reasons other than that of artistic value, but both have caught the imagination of a wider audience. In the examples of artistic work, I have included contemporary artists whose work bears some particular relevance to this project through their use of generative computer techniques. An investigation into the commercial considerations of non-repeating printed fabric follows, in which particular challenges which may well be considered interesting features in artistic pieces are shown to be unviable in a commercial length of fabric. The final part of Chapter Four gives examples of the preliminary design experiments in which semi-manual techniques were developed to

produce design examples. These design examples are then evaluated with particular reference to their construction, visual qualities, commercial viability and suitability to a contemporary market in terms of pattern design and gender implications. The results of this evaluation are then exploited in the production of the software prototype discussed in Chapter Five.

The penultimate chapter, then, concerns itself directly with motivation and construction of the software prototype and design examples produced through it. I begin by extending the discussion of commercial considerations submitted in Chapter Four by giving reference to the future possibilities provided by the technological advances in ink-jet printing on fabric. These advances already mean that it is possible to print long lengths of fabric directly from a digitised design on computer via an ink-jet printer. However, this normally entails providing the computer with a design in the form of a repeating unit, which is then manipulated by the software. Potentially though, fabric of any length could be printed in which no deliberately repeating structure was present. The innovation in the software designed for this project is contained in the fact that the need for a repeating structure is not required or desired; hence a revolutionary form of pattern on fabric can be produced. While design examples have been produced to demonstrate the possible effects, collaboration with commercial ink-jet printers has been beyond the scope of this research. The design examples themselves are each discussed with reference to the theoretical and social analyses and the technical considerations presented in the previous chapters. The parameters of success are cultural, commercial and social. While the cultural parameters are measured through the balance of the gendered features of the pattern, and the commercial parameters are measured through the pattern's ability to adhere to the rules developed in Chapter Four, social success, which could be measured through market research, has not been undertaken for this project. However, many of the contemporary issues discussed in Chapters Three and Four, such as fascination with science and randomness, and ambivalence towards existing definitions of masculinity and femininity, would suggest that non-repeating patterns which follow the style of these design examples would be acceptable and desirable on contemporary clothing.

Finally, the conclusion shows how a new design strategy has evolved during the process of the research by bringing together the concepts which run through this thesis, highlighting the appropriateness of the research in the contemporary environment and the strengths of the multidisciplinary approach taken. By summarising the work of the previous chapters, the design strategy itself is explained and detailed. Then, the design strategy, together with the software prototype and design examples,

are considered for their contribution to knowledge and wide-ranging usefulness to fellow researchers and practitioners. The thesis is completed by an exploration of future possibilities and directions for furthering the research.

Chapter 1

Theoretical Issues

1.1 Overview

As outlined in the introduction, the purpose of this thesis is to examine pattern on clothing with the aim of developing a design strategy which encourages innovative use of pattern on clothing, thus reflecting the contemporary ambivalence towards traditional stereotypes both in pattern and in the wider context. The particular stereotypes which this work is addressing are those concerning gender. In this chapter, issues of gender and stereotyping are discussed and related to clothes, and to pattern on clothes. This will lead to a method of identifying gendered features of pattern design which will then be utilised in the forthcoming chapters. Hence, the chapter will provide a theoretical grounding for the research and provide the general background for the methods of study the work will take.

Examining the visual and cultural features of pattern on clothing in the contemporary Western context is unusual, if not unique. There are many reasons why this is the case; some of the key ones are outlined here, followed by counterarguments and justifications which locate and validate the research. Some of the reasons, it will be shown, require little counterargument as they are predicated upon the history of Western patriarchal society. Others, such as the difficulty in formulating a meaningful and relevant method of study, are given more attention in order to ground the theoretical discussion in a balanced way.

The chapter then continues with an investigation of theoretical discourses and movements which are appropriate and useful to the study. Throughout this section it is important to remember that the motivation is to develop a method of pattern analysis, hence the discussion is very much focused towards this aim. It is not, therefore, intended to provide a comprehensive treatment of gender or methods of visual analysis, but rather to guide the reader towards the investigative method used throughout the thesis. Communication and meaning, gender and the implications of gender in clothing are considered before looking at the specificity of pattern on clothing. The underlying theme throughout is the concept of oppositional pairings and their impact on social hierarchies and gender relations.

The final part of the chapter indicates the method adopted in order to analyse representations of masculinity and femininity in textile patterns for clothing. Here, the binary concept is used to define oppositional pairings of visual features which can be seen as representative of gender. The results of an empirical survey undertaken during

the course of this research are discussed, giving additional validation to the chosen pairings and their gender associations. Finally, the chapter will show how these pairings will be used to discuss gender associations in the next two chapters, with emphasis on the fluidity of the analysis and ability through this technique to find a method by which gender associations on pattern can be discussed without assigning fixed meaning, or attempting to be over deterministic.

1.2 Lack of precedents

In this section I will discuss the lack of precedents for theorising textiles in a socio-cultural manner and offer some explanations. As this is a study of pattern on clothing, it is necessarily a study that crosses the disciplines of textiles and fashion. Both of these disciplines have been somewhat overlooked in terms of theoretical discourse, though some accounts of fashion, particularly psychological ones have been available from the beginning of the twentieth century. Elizabeth Wilson, writing in the early 1990s said of fashion:

> Historically it has rarely been afforded the serious contemplation reserved for the arts of literature, painting, sculpture, music and theatre, nor has its analysis competed successfully with the debates around popular cultural forms of the last half century: television and popular music. In recent years, however, the critical obsessions with design in architecture, advertising and product design have gradually extended to include fashion. (Wilson in Ash & Wilson (eds) 1993: xii)

Indeed, 'Fashion Theory' is a phrase that has become commonplace in design circles over the last few years. Perhaps the most significant event which consolidated the use of this phrase was the launch, and subsequent success, of the journal entitled *Fashion Theory* in 1997 by Berg Publications. This new discipline, joining others such as Art Theory, Film Theory, and Design Studies gives voice to the discussion of the application of socio-cultural theories to their given fields of study. They are not single theories divulging a singular fixed meaning of each subject, but give a general title under which those interested in the sociological, psychological, psychoanalytical, anthropological, historical or cultural aspects of the subjects can place their research.

In some ways it is more difficult to label and categorise textiles in a similar way. Though the boundaries between fashion and art are often fluid, textile art and fibre art are disciplines in their own right. Even by defining the discipline more precisely to 'textile design' the subject splits between interiors and clothing. While, as Entwistle

(2000: 1), says: 'Fashion is about bodies' no such generalisation can be made about textiles.

Contemporary textiles writing tends to fall into three categories: historical (both textiles as artefacts and textile production, e.g. industrialisation and mill working), technical/scientific (concerned with the development and manufacture of yarns, fabrics, dyes, etc.), and market-based (economic and trend forecasting research). Research journals for textiles tend to follow the same pattern, with examples such as *Textile History* (history); *The Textile Research Journal*, (science, technology, manufacturing) and *Textiles Magazine* (Industry based, technology, marketing, management). *Ars Textrina* is possibly the most diverse, its policy statement stating that contributions are encouraged from 'any areas related to the theory and practice of textiles and costume'. However, in practice, the bias is historical. The articles that have covered socio-cultural issues concentrate on costume rather than textiles.

As will be further discussed below, textiles almost always require an end-use context in which to be studied, so journals from the wider context of clothing and textiles such as the *Clothing and Textiles Research Journal*, which carries historical, scientific, market-based and socio-cultural articles can be viewed as more useful. However, in practice, articles concentrating on the socio-cultural aspects of textiles are limited. In March 2000 *Point: Art and Design Research Journal* published a fashion and textiles specific issue which carried articles which crossed over the boundaries listed above, and, as mentioned in the introduction, Berg Publishing are soon to publish a new journal of textiles and culture.

The above discussion reflects one of the dilemmas in theoretical textiles research, namely that as a diverse subject it is difficult to categorise, and more than that it is possibly a mistake to attempt to define, or bring together such a wide variety of topics. The following discussion addresses other reasons for the overlooking of fashion and textile theory

1.2.1 Explanations

As shown above fashion and textiles have historically been overlooked by serious academic study. I will continue to address both areas, as they are inextricably linked in this research, though I will emphasise in particular the textiles aspect as it is this which provides the motivation for the project. The reasons for the lack of study will now be explored and discussed in such a way as to both explain, position and justify this

research more fully. The various explanations given by authors can be addressed in the following areas: context, triviality and femininity.

1.2.1.1 Context

One of the immediate problems which can be seen when initiating research into clothing and textiles is how to study them. There are a wide range of disciplines which could be called upon and decisions need to be made as to their appropriateness and combination. Many existing studies have relied solely on one discipline, thereby opening themselves up to potential criticism in their lack of consideration of another. Entwistle (2000: 55) tells us that 'Fashion is treated as an aspect of industry, manufacturing, marketing, design and aesthetics, consumption and lifestyle', while Barnard (1996: 21) says the study of clothing 'is obliged to range from issues concerning production and manufacturing, to issues concerning aesthetics and politics, taking in all of the social sciences on the way' and states that the results of any study will necessarily look different dependant on the method chosen:

> Because fashion and clothing impinge upon the concerns of so many disciplines, they must be studied in terms of those disciplines. But because they impinge on so many disciplines, it is hardly surprising that they look different when viewed in terms of them. (Barnard 1996: 20)

Entwistle criticises many accounts of clothing as providing separate analyses of the social, psychological and commercial factors. She states that much of the theoretical literature on fashion fails to take into account 'the mechanisms by which fashion translates into everyday life.' (Entwistle 2000: 3). In particular, psychological studies 'tend to be individualistic rather than social' (Entwistle 2000: 3) and anthropological studies tend to 'focus on non-western and traditional communities [and] have little to say about fashion as it exists in the west.' (Entwistle 2000: 3).

While fashion and textiles share the dilemmas and challenges of adopting a multidisciplinary approach, a problem which is specific to the lack of theoretical writing concerning textiles is that it could produce limited findings through the failure to consider the textile in context. In the contemporary Western environment textiles are not generally considered a commodity in their own right, but something which are further manipulated to produce end-products such as clothes, curtains and other

furnishing fabrics[1]. This explanation could also lead to the assumption that rather than a real lack of research, there is research which exists in diverse places associated with the discipline of the end-product rather than as a body in its own right.

However, in the case of clothing textiles this does not appear to be true. It is very rare, if not impossible to find an article in the *Fashion Theory* journal in which the focus of the research is the textiles; and, as mentioned above, publications which do provide a space for cross-over research rarely carry any articles with this emphasis.

It is interesting and frustrating to note that through this research it can be seen that much historical writing on fashion and textiles has kept very much to its separate disciplines. Dress historians tend to concentrate on garment shape and rarely discuss textile pattern, occasionally mentioning colour or scale. Textile historians, on the other hand, tend to concentrate on fabrics, dyes, processes, repeat structure and motif, but have little to say about end-use.

Whilst garment shape takes precedence over textile pattern for fashion historians, furnishing fabrics appear to take precedence over clothing fabrics for textile historians. The standard text *English and American Textiles: from 1790 to the Present* (Schoeser & Rufey 1989) could be considered a case in point. Though the title omits to mention it, there are no clothing fabrics in the book. Josette Brédif, writing about the popular French textiles produced in the Oberkampf factory in the eighteenth and nineteenth century acknowledges that '...the image of toile de jouy in the collective memory is nearly always a monochrome motif with human figures' (Brédif 1989: 91), which was used for furnishing fabric. However, she goes on to say that the wood-block prints, used for clothing, 'represent the largest, and perhaps most engaging, part of the collection', but continues: 'The multicoloured patterns...usually floral and used for clothing, did not elicit the same respect as the scenes that told a story.' (Brédif 1989: 91)

While many textile books avoid the subject, other authors are blatantly dismissive of end-use. In discussing costume and textiles of the Russian Revolution, Bowlt discusses the suitability and appeal of propaganda imagery on clothing textiles. He finishes by saying:

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[1] Notable exceptions to this are textile and fibre art.

> When all is said and done, we approach these textiles designs, both abstract and emblematic, as sources of aesthetic enjoyment, and whether they were able to function as dresses, skirts, night-gowns or coats now seems almost irrelevant. (Bowlt 1989: 28)

While contextualising the textile may be viewed as problematic, it can also be seen as challenging and exciting by providing a new ground on which, through addressing the conjunctures, a whole new vocabulary of meaning is acquired. This research necessarily draws on fashion and textiles writing, along with other disciplines, to support its findings.

1.2.1.2 Triviality

> 'Traditionally, fashion came at the bottom of the hierarchy of academic study, dismissed – and not only by intellectuals –as trivial and unworthy of serious discussion.' (Wilson 2001, p50)

Contemporary fashion theorists often cite the argument that clothing and fashion was considered too trivial to be worthy of study as a reason for the lack of writing in this area. Entwistle cites anthropologist Ted Polhemus as suggesting that 'body decoration and adornment' in the West has been seen as 'unimportant, ephemeral nonsense, unworthy of serious analysis' (Polhemus 1988 in Entwistle 2000: 53) and considers that:

> Fashion has also been subject to prejudices which prevent it from being taken seriously; it has been viewed as trivial, frivolous, irrational, wasteful and ugly. (Entwistle 2000: 53)

Barnard highlights the ambivalence engendered by fashion, which can be seen as 'both glamorous and respectable' and 'deceitful trivia to be pursued only by the intellectually challenged' (Barnard 1996: 3). He discusses the view of fashion and clothing as trivial through a series of examples including colloquialisms, anecdotal evidence of peer prejudice against fashion and textile students, and press reports (Barnard 1996: 2-3).

The consideration of fashion as trivial can also be seen in the wider context of the hierarchical distinction between 'high culture' and 'mass' or 'popular culture', which though less pronounced than fifty years ago, can still be found in evidence today. In the same way that watching an opera is often considered to be a more valuable experience than watching a soap opera, the study of classical subjects is still often represented as more worthy than that of contemporary popular ones. The discipline of media studies is often in the firing line as representing the 'dumbing down' of

education (Wilson 2001: 8). In 2000 Chris Woodhead, the then Chief Inspector of Schools was reported as criticising 'vacuous' courses offered by universities, among them media studies and knitwear (Smithers 2000: online).

This contemptuous approach to the study of popular culture was also highlighted in *The Times Higher Education Supplement*. When reporting on the success of *Fashion Theory* the article began in this somewhat tongue-in-cheek way:

> The thought of applying stodgy cultural theory to the ephemera of fashion may make your eyelashes curl. Fashion is, in theory at least, supposed to be fun. But fashion theory? A contradiction in terms, surely. (Worsley 1998)

If being considered fun excludes a subject from serious analysis then many areas of popular culture would be unworthy of study, but of course there are numerous exponents of popular culture who would argue that it is possible to learn just as much about society from this as from investigating what are considered to be the 'higher' arts. Wilson is one such exponent who argues that:

> Mass culture deserves serious analysis: the researcher learns as much from an investigation of a comic book, a film or the back of a cereal packet as from the perusal of modern classics or atonal music, possibly more... (2001: 8)

Agreeing with Wilson, I would state that this research exemplifies how a popular cultural phenomenon can be examined using a variety of methods and tools, to demonstrate findings which, while making no universal truth claims, highlight some of the motivating factors in gender representation through pattern on clothing.

Studying a phenomenon of popular culture may also be criticised for its lack of empiricism, ability to follow a scientific model and of the production of singularities rather than generalities. All of these accusations can be associated with the dominant masculine view of science and the rational as primary, which is considered further below.

1.2.1.3 Femininity

When considering this notion of fashion and clothing as trivial, it is interesting to address the question of how it came about. Since the nineteenth century fashion and decoration have been associated with women, which leads to the investigation of the relationship between the notion of trivial and of feminine. Chadwick, addressing the

issue of the undervaluing of women artists clearly links the two concepts and the sentiment of this quote can easily be translated from fine art to design:

> Qualities associated with "femininity", such as "decorative", "precious", "miniature", "sentimental", "amateur", etc., have provided a set of negative characteristics against which to measure "high art".' (Chadwick 1996: 9)

Sparke's account of the association of decoration and domestic 'taste' with women shows that it was not until the end of the nineteenth century that it became problematic. She describes the 'Victorian domestic world' as being 'valued as a complement to the masculine world of work...' (Sparke 1995: 3). The massive 'social, demographic, economic, aesthetic and psychological' transformations which 'constituted the onslaught of modernity' in the latter part of the nineteenth century led to:

> '...the emergence of a set of polarised value systems and ways of relating to the world. The masculine experience of modernity dominated and eclipsed its feminine equivalent, rendering the latter marginal and trivial. (Sparke 1995: 4)

This polarisation was consolidated by advocates of modernism in the early part of the twentieth century, such as Adolf Loos and Le Corbusier who eschewed all forms of decoration which they saw as 'a denial of function...a denial of purity and of the essential universality of the object.' (Sparke 1995: 107). Woodham tells us that:

> For Corbusier the adjectives 'neat', 'clean' and 'pure' were linked with healthiness; there was also an implicit charge of deceit in his account of ornamentation as a disguise for flaws in manufacture, a rather more measured view than Loo's inference that the ornamentalist was not only criminal but somehow mentally unstable. (Woodham 1997: p33)

Anscombe (1984: 110) tells us Loos argued 'that style, or fashion, was a destructive, 'feminine' force within art... '. The vestiges of these views seem to have lingered on through the twentieth century, leaving decoration and adornment not only still considered to be a feminine pursuit, but also to seeing it as one to be considered lowly, inferior or irrelevant.

One of the legacies of this period has been a prioritisation of the rational: a belief in science over art. While postmodern thought would suggest a decline in belief of metanarratives likes science and progress, they are concepts which have failed to go away, as the discourse on the reporting of scientific research in the contemporary media in chapter three will show.

Similarly, art in our culture enjoys a higher status than design and, as Barnard says 'Fashion design, as a design activity, therefore enjoys a lower status than any of the so-called fine arts.' (Barnard 1996: 23). This prioritisation can be shown to be extended to one of masculine over feminine:

> ...when men are engaged in cultural production, it is more likely to be referred to and valued as transcendence and revelation, and when women are engaged in cultural production, it is more likely to be dismissed as fancy. When men are engaged in cultural production, the results of that production are more likely to be called art, and when women are engaged in it they are more likely to be called craft or design. (Barnard 1996: 24)

The disciplines of fashion and textile design are particularly associated with the feminine, both physically, with the majority of fashion and textile students and practitioners being female; and theoretically, through the feminine associations of decoration, craft, and the home. To split these prioritisations down even further, Attfield confirms the masculine prioritisations within the realm of design:

> The dominant conception prioritises the machine (masculine) over the body (feminine). It assigns men to the determining, functional areas of design - science, technology, industrial production – and women to the private, domestic realm and to the 'soft' decorative, fields of design. (Attfield 1989: 201)

This hierarchical view of disciplines is visually represented by the chart in Figure 1-A. In each case, the left hand side of the opposing pair is prioritised over the right, with the higher priorities shown towards the top of the diagram. A further mapping may be considered in light of the discussion above in which the left hand side of each pair is associated with the masculine, and the right with the feminine. Some qualification is necessary here. While science may well be considered masculine in isolation from its opposing pole, art may not be considered feminine, particularly in light of the knowledge that historically most recognised art works were produced by men. However, when given the science/art pairing it would be usual for art to take the feminine side of the mapping. This diagram, then, clearly illustrates that the more feminine the association of the discipline, the less value it is assigned culturally.

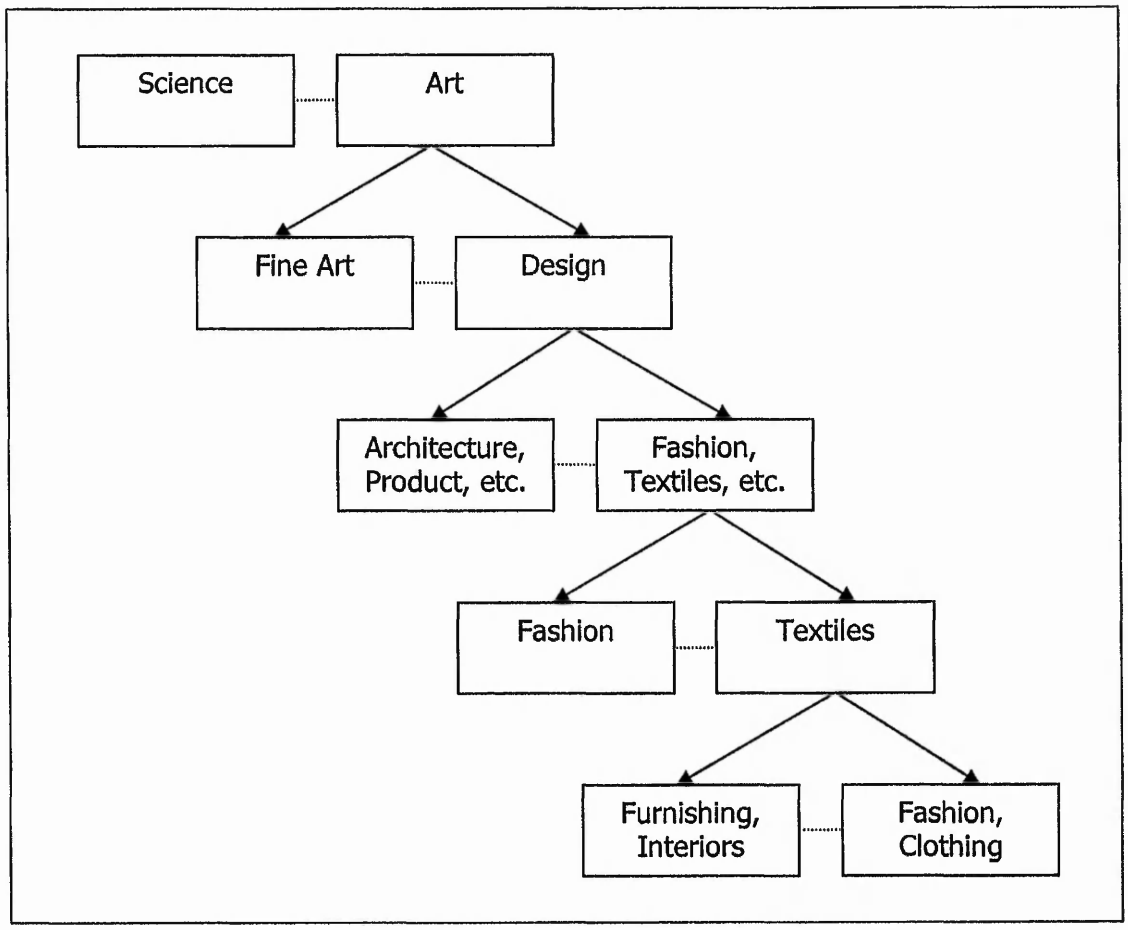

Figure 1-A: Diagram to show prioritisations in disciplines

1.2.2 Counterarguments

The above sections have shown various explanations for a reticence to examine textiles in a socio-cultural framework. The final two explanations, triviality and femininity, can both be accounted for by historical circumstance and bias. Wilson argues that with the advent of postmodernism and the growth of academic writing about it in the late 1980s, it was surprising that fashion was still neglected as a subject of academic study:

> ...fashion was in particular a neglected aspect of the postmodern when it should have been central. Fashion was especially congruent with postmodernity for a number of reasons: it was, rightly or wrongly, primarily associated with women and the feminine, one of the most important of the Others for whom postmodernism claimed to have found a voice... Furthermore, fashion, seen as a popular form, a manifestation of pluralism, pleasure and the demotic, offered an opportunity to re-evaluate popular, kitsch and 'low' aesthetic and cultural forms, and to break down the distinction between high art and popular culture. (Wilson 2001: 51)

Here, Wilson counterattacks the study of fashion as feminine and trivial (or not as valuable as high art) by asserting that these two things, among others, have come to be the major interests of postmodern commentators. Wilson's argument clearly shows postmodern discourse should, and at least partially does, give space to theoretical discussion of this nature.

The criticisms of studying everyday activities and objects are rooted in an elitist and patriarchal system which, while it cannot be ignored, need no longer be a justification for overlooking relevant and valuable research. While any account must be rigorous and thorough, empiricism and the scientific model provide only one possible model, rather than the model all research must take.

The first explanation, of context, provides perhaps the most relevant and challenging to counter. Questions arise as to how one can reconcile the multitude of disciplines and approaches that can be taken in forming an account which provides a significant contribution to knowledge. A study such as Alison Lurie's 1980s account, *The Language of Clothes* (1982) provides a much-criticised example of some of the potential pitfalls. In her psychological analysis she attempts to show that clothes communicate, but her attempt to make clothing fit into the grammatical model of language is hampered by becoming overly deterministic and simplistic. She also uses a psychoanalytical approach which assumes that the messages transmitted through clothes are unconscious which, while undoubtedly having some merit, disregards many other motivations such as social conventions, trends and economics. Wilson (1985: 57), Barnard (1996: 27), and Entwistle (2000: 67) have all provided accounts of the shortfalls of her approach.

The second part of the context argument concerned itself with the view that as textiles are rarely viewed as artefacts in their own right, the study of them out of the context of their end-product is inappropriate. However, I would argue that the textile itself can be considered as the primary aspect of study, providing the end-context is considered and deliberated upon in a secondary context. In 1996 Kaiser addressed the Textile Institute World Conference with a paper in which she stated:

> Textiles themselves become part of cultural discourses, as they circulate aesthetic patterns, cultural imagery, gender symbolisation, technical understandings, and actual goods throughout the world. (1996: 283)

She goes on to implore researchers to:

> ...enhance our understanding of the sources of ideas and meaning to which textiles refer, and to become aware of the complex intersections of ethnicity, gender, sexuality, and other variables – in and across communities and nations. (1996: 291)

While her motives are admirable, and her statements can be seen as confirming my view that textiles may be viewed as the primary subject of study, the body of her own work seems to be largely based around the wearer's relationship with items of their clothing, in a rather wider context than that of the constituent fabrics.

This research, while investigating the quite specific phenomenon of pattern on clothing in Britain in the two periods of 1967 – 1973 and 1997 – 2002, will use a variety of approaches and attempt to show developments, conjunctures and possibilities across the findings of these methods. This avoids the danger of attempting to attribute specific or fixed meaning to something which is ultimately fluid and diverse, but gives the opportunity to relate research from different fields to give credibility and rigour to the findings. In the following section the approaches of various theorists and movements will be discussed in relation to the work.

1.3 Theoretical Approaches

There is a certain dichotomy in attempting to analyse fashion and clothing in that while 'it seems intuitively correct to say that one sends messages about oneself with the fashions and clothes one wears' (Barnard 1996: 28), fashion itself is often considered to speak '... of change merely for the sake of change or, less benignly, as change solely for the sake of commerce.' (Morgado 1996: 44). This study is concerned with the everyday clothes people wear in which social, psychological and commercial forces have a bearing on the decisions made. We have already established that the study of everyday clothing has been largely overlooked and requires a multi-disciplinary approach. Fashion and its vagaries are an important factor in clothing decisions, but so too are many other factors:

> While fashion is important for defining styles at a given moment, these styles are always mediated by other social factors, such as class, gender, ethnicity, age, occupation, income and body shape, to name but a few. (Entwistle 2000: 49)

As stated, this project is concerned with pattern on clothing that is in everyday use; clothing as worn, rather than clothing as art, or even clothing as fashion, though of course these three aspects of clothing cannot be prised apart into separate studies, as

they are inextricably linked. The following discussion will now elaborate on the issues which are particularly relevant to the study. Firstly, in 'communication and meaning' I will address the issues of ambivalence, polysemia and undecidability: all postmodern concepts which need consideration in any attempt to ascribe meaning to contemporary phenomena. The second section will discuss the concept of gender, with particular reference to its common usage as an asymmetric binary opposition. Following on from this, clothing and gender are discussed, specifically how male and female dress is often utilised in an oppositional way. Finally, I will provide specific examples of oppositional qualities which may be used in an investigation of pattern.

1.3.1 Communication and Meaning

The very intention to study the social significance of pattern on clothing implies that somehow meaning is to be sought within the attributes the patterns hold. This immediately raises a host of issues, some of which have been addressed above, concerning the validity of attempting to fix single meanings and also concerning finding an appropriate method of analysis.

A structuralist approach would look for relationships or structures to which a universal meaning could be attributed. Strinati describes structuralism, the theoretical movement which became popular in the 1960s, as making 'claims about the universal character of mental and cultural structures, and their causal effects in giving rise to observable social phenomena.'(Strinati 1997: 89) and Turner tells us 'Structuralists saw culture as the primary object of study, and approached it most often by way of the analysis of representative textual forms' (Turner 1996: 29). In this type of analysis then, the pattern on an item of clothing would become the textual form to be analysed. The main criticism of this practice, which has been much discussed within the theoretical context of poststructuralism and postmodernism, is the concept of universality. Certainly, the very nature of fashion would suggest that attempting to find universal structures in pattern on clothing, across culture and over time would be impossible.

Two principles associated with structuralism do, however, provide useful tools for analysis. Firstly, semiotics, which provides a method of examining 'the cultural specificity of representations and their meanings...' (Turner 1996: 16). Semiotics does not make the claims to universality associated with structuralism. Rather, it shows that the relationship between the signifier (the physical element of the sign, such as a written word or drawn image) and the signified (the mental concept represented by

the sign, i.e. the idea of the 'thing' represented by the word or image) is usually arbitrary, and hence has the possibility to change across culture and time. It remains a useful tool for analysing text and visual images. Some interesting questions arise in attempting to perform a purely semiotic study of pattern on clothing. If presented with an image of a person wearing a patterned top there would clearly be a range of signs to draw on in order to attribute meaning: for example the sex, age and cultural identity of the wearer would influence the readings made. An example of the diversity involved is given in a comparison of Figure 1-B and Figure 1-C.

Figure 1-B shows the well-known British soap opera character from *Coronation Street*, Hilda Ogden. The stereotypical attributes of her character are visually represented in this publicity shot or still from the series. The date of the image is unknown, but from looking at similar images it appears likely to have been from the 1980s. The cleaning equipment and head scarf portray her as a working class cleaning woman, while the flying ducks on the wall represent her aspiration towards the middle classes and simultaneously give a clichéd represention of lack of taste. Though her dress or blouse cannot be seen clearly, it is possible to identify it as having a printed floral design of a style usually referred to as chintz and often used for furnishing fabrics. The emphasis on the domestic is shown clearly though the references to cleaning and pride in her home. We may surmise that the producers of the image deliberately selected this type of floral fabric to reinforce the character's relation with domesticity and dubious taste.

Figure 1-B: Hilda Ogden: Character from TV soap opera *Coronation Street* (BBC 2000: online)

In complete contrast to the previous image, Figure 1-C shows the top half of a page from women's magazine, *Marie Claire*, in spring 2002. 'Get the look' is a regular feature in the magazine. The premise for it, of showing the reader where to buy clothes in order to look like a particular celebrity, is one followed by many similar contemporary magazines. In this case the celebrity is Kirstin Davis, an actor from the popular American TV show *Sex in the City*. The vest top portrayed on the right hand side of the

image is printed with a design which is a similar chintz style to the pattern to the previous image. The scale is also similar, though the colour is slightly different.

The message given to the reader in this article is that the top, and hence the pattern, is 'glamorous and girly', and more so that the reader could be those things by wearing it. Obviously, meanings and connotations can change over time, and these two pictures may be separated by up to twenty years. However, it is still possible to see the same type of portrayal in TV soap operas and advertisements for which that stereotype of domestic femininity is required.

The producer of the second image (and perhaps the garment) may be inviting the reader to dismiss any previous undesirable connotations this style of print may have had, or to read it as a subversion, or ironic decontextualisation of those connotations. This ironic appropriation of previous styles also highlights a potential difference between fashion as artistic or postmodern statement, and clothes as worn artefacts. Essentially, the fashion designer's decision to use a print of this style may be to subvert, be ironic or simply to plunder the past in order to create something different to the last fashion. However, the potential consumer of the garment may not be able to shrug off the negative associations the pattern gives them in order to be seen as being fashionable.

Figure 1-C: Floral print top, *Marie Claire*, May 2002, p74

These two images show two very different representations of similar patterns, one domestic and of bad taste and the other of glamour and good taste. If presented with a third image showing only a sample of a chintz fabric, different connotations may arise. This highlights the importance of context in any study of pattern on clothing and the difficulties in attaining sufficient context to make meaningful analyses.

Another aspect of structuralism which provides a useful tool is the concept of binary oppositions. Lévi-Strauss proposed that the human brain's method for dealing with the world was to chop items up into distinct categories, rather than leave them in their natural space/time continuum. He then utilised his theory to attempt to find universal systems across cultures. Leach (1996: 30) uses the example of the visible light spectrum to explain Lévi-Strauss' thinking. The light spectrum is a continuum where each colour blends into the next. It has been segregated by humans into the individual named colours that we associate with the rainbow. The most basic form of categorising, according to Lévi-Strauss, is to produce a binary opposition: an either/or grouping, pairs of which are then linked together in matrices, to form cultural systems. Binary oppositions can be seen as both liberating and enslaving. The discussion on gender, below in section 1.3.2, shows that while some feminists used oppositional theory to explain patriarchy and its inherent problems, the very act of categorising can also be seen as limiting and prescriptive. Similarly, post-structuralist thinking has tended to look for ways to celebrate difference, subvert oppositions, allow for the existence of continua rather than distinct categories, and to dismiss the universal truth claims of structuralism.

Derrida's post-structuralist theories have led to the now familiar concept of deconstruction. Norris tells us that:

> To 'deconstruct' a text is to draw out conflicting logics of sense and implication, with the object of showing that the text never exactly means what it says or says what it means. (Norris in Norris & Benjamin 1988: 7)

This process, in very simple terms, involves identifying opposing or contradictory elements of the text and showing firstly that they are hierarchical, secondly that their hierarchical relationship may be inverted, and finally that the text is characterised by this 'pattern of unstable relationships' (Norris in Norris & Benjamin 1988: 8). Some critics have argued that Derrida's thinking leads only to an inverted hierarchy in which instability rules over certainty. Advocates point out that this is not the whole case:

> ...Derrida does more than this for his writing uncovers the dangers of thinking centred around hierarchical oppositions, a thinking which would leave their underlying presuppositions "unthought". (Gill 1998: 38)

As well as a method of critical analysis, the technique has also been adopted as a design strategy which allows traditional boundaries within a discipline to be overcome. Morgado describes this (with reference to fashion) as: 'a principle for undermining, or

calling into question, the seeming naturalness of relationships between things.' (1996: 45). Architecture is the discipline most closely associated with deconstruction, though fashion designers such as Martin Margiela have also embraced its principles.

1.3.1.1 Implications for the research

The discussion above has shown that while meaning is undeniably communicated through clothes, the meaning must always be contextualised and can never be viewed as inherent or 'natural'. Postmodernism has brought about much discussion over whether fashion can be given meaning at all as Morgado suggests:

> A key feature of the theories of postmodern culture is the suggestion that commodities in general, and fashion in particular, can no longer be interpreted in terms of any symbolic references, that fashion and style in contemporary society are characterized by an absence of symbolic meaning. (Morgado 1996: 49)

Rather than seeing this as a barrier to studies of clothing she challenges researchers to 'argue for assessments that recognise human agency and creativity in the context of postmodern consumerist culture...' (Morgado 1996: 51). In this study, that is the approach that is taken and the argument established is that while fashion, as a 'system' may have lost its symbolic references, clothing, as worn by people, is still subject to a range of social and psychological factors which confer meaning.

The relevance of deconstruction techniques to the project cannot be denied, in that the analysis of pattern on clothing will be investigating oppositional values and their associated gender hierarchies. The design work also uses the subversion, or perhaps democratising, of oppositional qualities in order to produce textiles unfettered by the traditional structure imposed upon them. However, the project makes no claims towards being either a fully deconstructive analysis of pattern on clothing, or producing fully deconstructed textiles in the design work.

1.3.2 Gender

Gender is a social construction which Butler describes as 'Originally intended to dispute the biology-is-destiny formulation' (Butler 1999: 9). In other words, sex is the term used to show biological difference between men and women, and this has been used as a tool with which to "prove" that women are "naturally" inferior to men. In the preface to Bleier's critique of biology and gender she states that 'The theme of

women's biological inferiority has been both implicit and explicit in biological science since the time of Aristotle.' (Bleier 1984: vii) She goes on to contend that:

> It is... an essential theme for the ideology and cultural practices of societies that require women's subordinance both in the home, as homemakers and mothers, and in the market place, as underpaid workers in the nurturing, helping and domestic professions. (Bleier 1984: vii)

Gender, unlike sex, is not biologically, but culturally dependent. This construct, as Butler says, allows for the possibility of change. Butler goes on to argue that while sex forms a logical (if contestable) binary of man-woman, gender has no similar requirement to produce a similar binary split (Butler 1999: 10). However, this is how gender is normally portrayed and the biological man-woman split which sex displays is replicated by the masculine-feminine split of gender. In chapter three, the increasing ambivalence contemporary society is showing towards this binary split will be discussed, along with the continued fascination with explaining and justifying difference through biology. Here, the discussion will focus on the implications of considering gender as a binary, and how this affects representations of femininity and masculinity.

In the previous sections an analysis was made of the polarisation and prioritisation of academic disciplines, beginning with the science-art split. As was shown, in each case masculine could be mapped to the prioritised pole, and feminine to the subordinate one. Similarly, many feminist authors have shown that most existing binaries follow the same pattern: mind-body; culture-nature; active-passive; order-chaos; rational-emotional; producer-consumer; public-private; hard-soft are all asymmetric oppositions in which the left hand side dominates. Not only that but the left hand, dominant poles of 'mind', 'culture', 'active', 'order', 'rational', 'producer', 'public' and 'hard' are all associated with the masculine while the subordinate poles of 'body', 'nature', 'passive', 'chaos', 'emotional', 'consumer', 'private' and 'soft' are associated with the feminine.

In particular psychologist Helen Haste tells us that:

> Western culture has a strong tradition of rationality overcoming the forces of chaos that is closely interwoven with masculine versus feminine, and body versus mind. (Haste 1993: 12)

The culture-nature opposition could also be woven into this argument, as the forces of nature (with their ideologically feminine associations) are usually seen as something which the forces of culture (science, technology, and by implication masculinity) are

seeking to tame. Haste concludes that this tradition requires the suppression of the feminine in order to maintain masculinity (Haste 1993: 12).

Modleski, on the other hand, uses the polarities to demonstrate, (in a similar argument to the one above in 1.2.1.3), how mass culture is subordinated to high culture through the terms used to describe it. Strinati (1995: 191) provides a table to illustrate her ideas which show the terms 'masculinity', 'production', 'work', 'intellect', 'activity' and 'writing' to be associated with high culture while their opposites of 'femininity', 'consumption', 'leisure', 'emotion', 'passivity' and 'reading' are associated with mass or popular culture. Strinati shows that Modleski's model illustrates her point that:

> the fear expressed by high culture critics about the role of mass culture in making audiences passive and vulnerable, and prone to consumerism, is equally a fear about the audience becoming feminine... (Strinati 1995: 191)

Associations of the feminine with the natural and the body are closely related. Entwistle (2000: 145) states that 'Modern social theory... has tended to see women as closer to the 'animal' or natural world because of women's role in reproduction'. This reproductive role can also be seen as contributing to the association of woman with the body. Butler (1999: 17) uses the feminine-masculine mapping of the mind body split, which she suggests is 'well documented within the field of philosophy' to suggest that binary distinctions in which one pole is prioritised over the other (such as the Western prioritising of mind over body) should not be accepted uncritically. In accepting them, she argues, the 'implicit gender hierarchy' is maintained and rationalised (Butler 1999: 17).

Gender, then, is a contestable site, but, as Connell (1995: 69) points out, men may have feminine attributes and women masculine ones. If this were not so there would be no need of the terms masculine and feminine over and above man and woman. Given these rationalisations of the imbalance in the cultural perception of masculinity and femininity, what can be done to address the asymmetry of the polarities? Revolution, in which the dominant pole is overthrown in favour of the subordinate, thereby maintaining the polarity but reversing the prioritisation, does not appear to be a satisfactory solution. Butler believes:

> The critical task [for feminism] is...to affirm the local possibilities of intervention through participating in precisely those practises of repetition that constitute identity and, therefore, present the immanent possibility of contesting them. (Butler 1999: 188)

1.3.2.1 Implications for the research

For this research, those 'practises of repetition' mentioned by Butler can be seen to be clothes. By establishing how masculinity and femininity are represented through clothing, and then looking for more specific representations of gender within pattern, it becomes possible to locate instances in which negative associations operate. This in turn gives the possibility of challenging or contesting them. While Chapters Two and Three will concentrate on investigating existing masculine and feminine representations through pattern on clothing, Chapters Four and Five will move the discussion into future possibilities and representations through the medium of the design work and the method it uses to challenge and contest contemporary meanings.

1.3.3 Gender and Clothing

In the introduction to *Men and Women: Dressing the Part*, Schreier tells us that:

> It ... becomes obvious that historically clothing has served to separate men and women. We define ourselves as being male or female through a system of opposition. (Schreier in Kidwell & Steele 1989: 4)

While difference has manifested itself in the most subtle or extreme ways throughout history, Schreier argues it has always remained. Not only that, but, just as we have seen above, the difference is used to subordinate the feminine (Schreier in Kidwell & Steele 1989: 5). In section 1.2.1.3, the linking of the feminine with clothing and appearance was discussed, and this is again highlighted by the mind-body split which aligns the feminine with the body. Betterton (1987: 7) explains that the very concept of femininity in Western culture '...is bound up very closely with the way in which the female body is represented.' and of course, representation of the body usually involves clothes.

Femininity, however, cannot be simply pinned down to one set of adjectives or one particular representation. Its very essence, as Tseëlon (1995: p33-34) points out is contradictory in that it is associated both with the natural and with artifice. In order to 'look natural' one is required to perform artifice in the form of fashion, make-up and other decoration. She questions whether this is 'indicative of inauthenticity of character, or external to the self.' (Tseëlon 1995: 34) and through her own study of interviews with women concludes that:

> The results of the study take us away from the discourse of true/false (sincerity/insincerity) into a dialectical discourse... The results indicate that a series of personas need not be incompatible with sincerity. By implication the conclusions indicate that being the 'decorative sex', and having many 'sartorial faces' is not the same as being false, manipulative or deceptive. (Tseëlon 1995: p52-53)

The implications for this work are twofold: firstly we can see that the binary premise of her study proves inappropriate when applied to a study of 'real women' and secondly that renouncing the decorative implications of femininity should not be seen as necessary in the process of attaining a non-subordinated status.

The importance of a gendered difference in dress has already been mentioned and appears to be essential in some form in all cultures. Though the boundaries between masculine and feminine are often crossed in clothing, distinctions remain. Experiments in unisex clothing in which female and male become indistinguishable have never gained popularity. As Steele asserts:

> Truly unisex clothing does not exist. Even in the mid-1970s and early 1980s, despite all the talk about "unisex" or "androgyny", most men and women still wore different clothes. (Steele in Kidwell & Steele (eds) 1989: 160)

Entwistle sees clothing as ' a crucial feature in the production of masculinity and femininity' (Entwistle 2000: 143). Going on to ascertain that:

> There is no natural link between an item of clothing and 'femininity' or 'masculinity'; instead there is an arbitrary set of associations which are culturally specific. (Entwistle 2000: 143)

Barnard makes a similar statement, but follows it by implying that though the links are arbitrary:

> ...once the decision has been made, the colours or garments form a paradigmatic set and meanings are determined or generated by means of the choices made from that paradigmatic set. (Barnard 1996: 113)

This is evidently the case, but how and why those decisions are made and who makes them are points not explored by Barnard. Indeed, it is questionable whether 'decision' is an appropriate word, given its implication of conscious intention. However, what is clear is that through some form of cultural or social consciousness gendered meanings exist, are sometimes subverted and do change. The following section explores ways in which some gendered signifiers have been explored by authors in order to demonstrate the variability and contentiousness of their examination.

1.3.3.1 Masculine and feminine signifiers in clothing

American costume historian, Claudia Brush Kidwell, uses historical fashion commentary to argue that masculine attributes are not inherently defined (Kidwell in Kidwell & Steele (eds) 1989: 125-126). Arguing against Desmond Morris's biologically deterministic view that broad shoulders represent masculinity and power, and that women borrow these symbols to gain power, she states that:

> The exaggerated shoulders of 1938 were viewed simply as a design detail that had been around for a number of years as part of what had become in the United States the healthy, athletic, all-American girl look. (Kidwell in Kidwell & Steele (eds) 1989: 142)

However she goes on to attest that:

> Six years later women were urged by the fashion press to abandon the padded shoulders, not just because they were old-fashioned, but because they were also too masculine. (Kidwell in Kidwell & Steele (eds) 1989: 142)

The masculine associations, she argues, had been gathered through the war period and were rejected after the war when there were concerns over women taking on masculine roles and attributes. The implication then is that styles are not adopted by women in order to appear more masculine, but they may be rejected when associated with masculinity:

> They [shoulder pads] were rejected in order to affirm the normal nurturing role of women – not because broad shoulders are inherently masculine, but because by association they had become redefined as masculine. (Kidwell in Kidwell & Steele (eds) 1989: 143)

In concluding her article, Kidwell makes a comparison with the shoulder pads worn in the 1980s. Writing in 1989, she had not had the benefit of hindsight with which to study this phenomenon. She appears to be making assertions to the effect that in this case social issues are much less significant then in the previous one, stating that shoulder pads were worn by both men and women and that they were worn to make the hips appear smaller (Kidwell in Kidwell & Steele (eds) 1989: 143). Though both these statements contain some truth, the second seems an unlikely reason for men to choose the style.

Shoulder pads of this period are now associated with 'power dressing' which has become synonymous with the work related gender struggles of the 1980s. Here, Barnard sees this not as women taking on masculine dress, but as a new model of femininity (1996: 116). Unlike Kidwell's view of 1930s dress however, the symbols of

this version of femininity are and were considered, however arbitrarily, masculine. Barnard (1996: 116) cites Davis's use of Molloy's 1977 *The Woman's Dress for Success Book* as advocating 'dark-hued, comparatively severe, man-styled jacket' (Davis 1994: 48) for women's business wear.

Entwistle considers the contradictory nature of power-dressing, examining in this case, Molloy's 1980 book, *Women: Dress for Success*. She quotes Molloy's advice not to be too feminine at work, suggesting that floral prints and salmon pink coloured garments will undermine authority (Entwistle 2000: 189). To highlight the contradiction Entwistle then tells us that Molloy also recommends wearing skirts rather than trousers, which are 'too masculine' (Entwistle 2000: 189). The suggestion then is not that gender neutrality be desirable, as the skirt is a highly significant symbol of femininity in Western culture, nor, for the same reason, that a totally masculine look be adopted. This may lead one to question whether this form of dress can be seen as 'a new model of femininity' as Barnard suggests, or whether femininity per se was becoming less desirable for women in this period. A prolonged study of the period would be necessary in order to answer that question, but it is worth noting that business wear was not the only form of dress in a period in which femininity was represented in at least two very different ways: firstly through the glamorous, high heeled, lip-sticked, 'big hair' look of popular American soap operas such as Dallas and Dynasty, and secondly through the romantic, frilly, flowery patterns of the extremely popular Laura Ashley fabrics and garments.

1.3.3.2 Implications for the research

The discussion above has indicated that, while gender representations and signifiers in clothes exist, they are arbitrary, subject to change, and not necessarily *consciously* adopted by the wearer as gender signifiers, though they may be consciously rejected for these reasons. It has also provided representation of the method other authors have used in investigating gender signifiers in terms of the social history of the period. In many cases this has involved examining the fashion commentary of the period in conjunction with the clothes; a method adopted by this study in Chapters Two and Three.

Within this research I am seeking to identify pervading symbols of masculinity and femininity in pattern on clothing in order to analyse how representations may be seen to blur, cross-over, or indeed remain constant in conjunction with the prevailing social

climate of the time. It may be considered that in contemporary culture the gender distinctions have been blurred more than ever before and more unisex clothing (particularly in sportswear) is available. But Entwistle argues that gender may be seen as *more* significant now, as fashion commentary often describes styles in a gendered way (2000: 180). This point will be taken up in Chapter Three, where the investigation of contemporary fashion examines fashion commentary in conjunction with pattern styles.

1.3.4 Gender in Pattern Design

Having discussed the implications of gendered references in clothing, and the way in which their hierarchical values can continue to undermine the feminine, the discussion will now investigate particular motifs and adjectives used to describe textile patterns. By arranging these words into oppositional pairs the research can then seek out the gendered hierarchical associations within them.

One particular type of pattern which has become strongly associated with the feminine is the floral design. This has already been discussed in section 1.3.3.1, where it was described as too feminine for work wear. This association can be linked to the association of women with the natural. As with the examples discussed above, the association is arbitrary and has not always existed: Figure 1-D shows a man's dress suit from the late eighteenth century with the jacket and waistcoat showing an elaborate embroidered floral design.

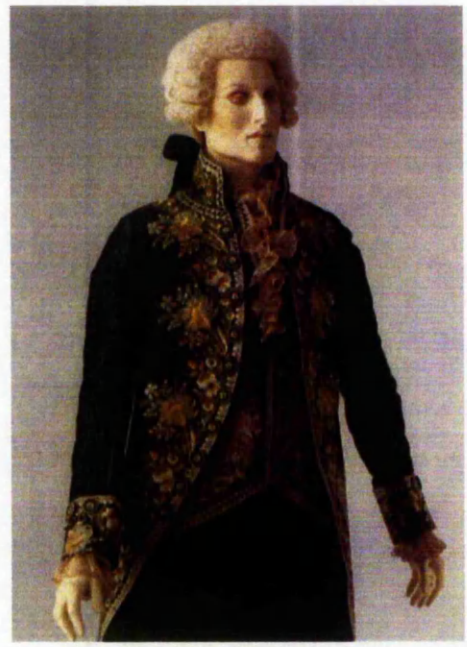

Figure 1-D: Man's dress suit, probably French 1790s. V&A collection (Rothstein 1996: 60)

Though the association of floral patterns with femininity may be arbitrary, it is possible to identify social reasons for its existence. In Griselda Pollock's (1988) study of women in art history she identifies that painting still life, landscape and portraits, (which were the subjects most often chosen by women artists), was considered less prestigious than other forms, particularly the nude human figure which 'from the Renaissance to the late nineteenth century' was 'the basis of the most highly regarded forms of art' (Pollock 1988: 44) The result of women artists being excluded from life classes, Pollock argues, was that: 'By association, women artists specializing in these 'lesser' genres were themselves regarded as artists of lesser talent.' (Pollock 1988: 44) Pollock discusses flower paintings in particular, quoting a 1952 book on the subject which states that 'flower painting demands no genius of a mental or spiritual kind' (Grant (1952) in Pollock 1988: 44) and goes on to inform the reader that over half of the flower paintings produced in the late eighteenth and nineteenth centuries were by women (Grant (1952) in Pollock 1988: 44). Hence we are seeing an association of women with floral representations, and at the same time a devaluing of the floral as a representation of value.

In section 1.2.1.3 it was seen that the separation of feminine and masculine, and subsequent devaluing of feminine through its association with the domestic, private sphere occurred in the late nineteenth century at the time of mass-industrialisation and urbanisation. The Victorian's opulent decoration in the home favoured mimicry of natural forms, and decoration of the home was seen as a feminine pursuit, which gave rise to, (or was caused by) a connection between the use of natural forms in decoration and the feminine. Late nineteenth century design reformers saw the over abundance of decoration and the use of natural forms as symbolic of bad taste. Both Pugin and Eastleake were two reformers who spoke out vehemently against pattern and naturalistic imagery (Sparke 1995: 65). Sparke uses key texts from the time: *The Grammar of Ornament* by Owen Jones (1856) and *The Principles of Decorative Design* by Christopher Dresser (1873) to ascertain that in 'good design':

> ...nature had to be controlled, ordered and transformed through the application of abstract principles. Several texts suggested ways in which nature could be tamed through the use of repetition and geometry (Sparke 1995: 66)

Here, then, it is not only the linking of femininity with organic styled patterns, or indeed any type of patterns, but also this masculine concept of rationalising and controlling through geometry and order, which reflects the feminine/masculine

associations with the chaos/order and natural/culture binaries discussed in section 1.3.2. We can see the beginnings of an opposition between geometric designs and organic or floral ones, and also perhaps the most oppositional pairing of all in textile design, between pattern and plain, or unpatterned.

The floral/geometric binary is probably the easiest to trace and document, and in many ways other oppositions are related to it. For example in a binary of angular/curved the angular can be linked to geometry, and the man-made or constructed, while the curved can be linked to organic, natural forms.

In attempting to identify letters of the alphabet appropriate to particular market groups for use in the creation of new brand names, one 1994 study used focus groups to evaluate opinions (Pavia & Costa 1994: 185 – 284). The study investigated both the sound and look of the letters. Consistently, the softer sounding and less angular looking letters were assigned to the feminine, while the harsher sounding, angular looking letters were assigned masculine gender. This study also refers back to an earlier cross-cultural study in which people were asked to identify the gender of stick figures with either round or square heads. Generally, regardless of culture, the round-headed figures were said to be female, while the square-headed ones were labelled male (Pavia & Costa 1994: 186). Pavia & Costa do not attempt to theorise their findings, but rather to simply point out that, for the respondents of the survey, the belief was that 'angularity is masculine and softness is feminine' (Pavia & Costa 1994: 201) which is consistent with the theoretical associations demonstrated throughout this chapter.

1.3.4.1 Implications for the Research

Using statistical responses to questionnaires, while not providing explanations has been a useful way to show that the binary associations discussed theoretically above are still identifiable in contemporary culture. As part of my MA research in 1995 an informal survey of 17 men and 27 women showed that all of the men and most of the women who responded assigned masculine gender to computers, while all the respondents assigned feminine gender to flowers (Carlisle 1995).

For the research for this thesis, a survey of just over 100 people was designed using both images and words which can be associated with textile patterns[2]. Figure 1-E

[2] Results of the survey can be found in Appendix A and on the accompanying CD-ROM

shows the results graphically. The neutral assignments have been removed from this graph for clarity and ease of reading[3]. The floral image and word were both gendered feminine by virtually all the respondents; a small number gave a neutral response, but none gendered the floral masculine. The geometric image and word, while gendered masculine by a clear majority, was less clear cut. A significant number of respondents used the neutral option, while a small number gendered the geometric feminine. Similarly, angular and curved qualities were generally gendered masculine and feminine respectively, backing up the theoretical findings.

The words 'ordered', 'chaotic', 'scattered' and 'regular' did not correlate with the theory as convincingly. 'Regular' and 'scattered' did show the respective masculine and feminine gendering that was expected, but with many more respondents choosing the neutral option, and a few choosing the opposite gender. While a majority of women assigned neutral to the word 'ordered', closely followed by feminine and then masculine, the majority of male respondents assigned the word 'ordered' to masculine, closely followed by neutral, with fewer assigning it to the feminine. The majority of men and women assigned neutral to the word 'chaotic', the remainder being split fairly evenly between masculine and feminine, with a slight bias toward the feminine. This anomaly may have several explanations. While most of the words are terms which relate easily to pattern on clothing, 'ordered' and 'chaotic', probably do not, hence immediate visual gender distinctions may not be invoked. Also, 'ordered' may be associated with the domestic activities of tidying up and neatness, themselves gendered feminine, but conversely could be read as either giving an order, or having received and order, which would once again shift the associations made by the respondents.

Perhaps the most surprising element of the survey was that the respondents were highly willing to assign gender in this way, in our contemporary society where boundaries are continually being broken, reassigned, or becoming fluid. However, the study does not prove either that the respondents 'believe' in the stereotypes rather than just being culturally aware of them, or that they view them in a hierarchic oppositional way. This is something which will be considered further in Chapter Three.

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[3] The neutral assignments have been removed from this graph for clarity and ease of reading. Where significant they are mentioned in the text.

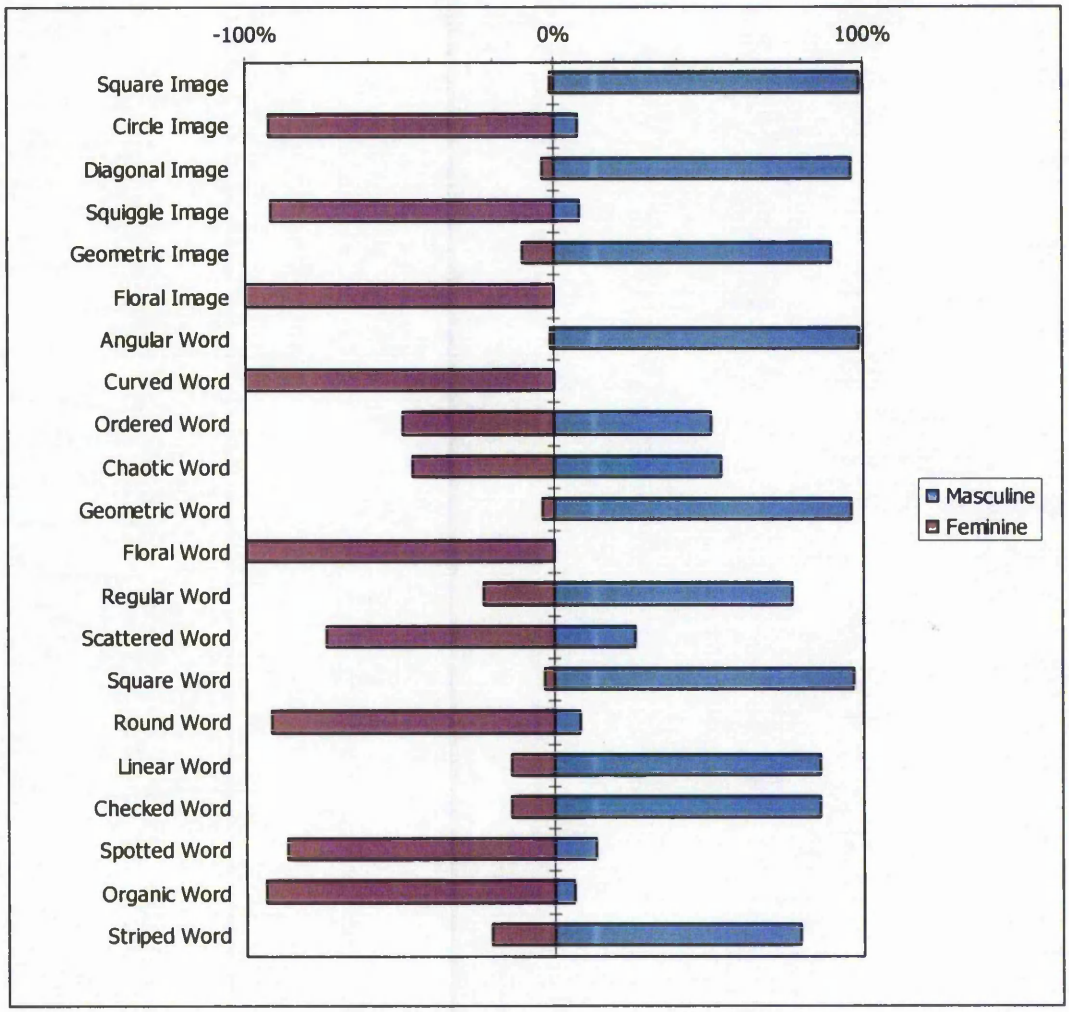

Figure 1-E: Graphical representation of gendered word/object survey

1.4 Summary

This chapter has provided the theoretical groundwork which will be referred to and utilised throughout the thesis, both in the analytical chapters and in the design strategy chapters. The initial discussion over the lack of precedents, together with the explanations proffered can be seen not as peripheral but as central to the following theoretical discourse. The analysis of binary hierarchies in the latter part of the chapter reflect the hierarchies identified and proffered as explanation for the lack of precedents considered in the first part of the chapter.

Each section of this chapter led strategically to the next, so that the theoretical discussion began by looking at a generalised view of how cultural and social meaning is attributed and how it may be analysed. The next section focused these methods with specific reference to gender, which in turn is focused into gender and clothing and

finally, gender in pattern on clothing. At each stage the hierarchical binaries were addressed and compared, using a variety of sources to strengthen the multi-disciplinary approach of the work. The culmination of this, in the final section was to show how specific features, motifs and styles within pattern design could contain gendered meaning, however arbitrary. The most significant gendered opposition was shown to be organic vs. geometric, with its references back to the more general oppositions of nature vs. culture, chaos vs. order, and even, through association, body vs. mind. Also considered was the curved vs. angular binary, which refers back to hard vs. soft and nature vs. culture (or constructed). In the survey shown in Figure 1-E, the words 'ordered' and 'chaotic' fail to show any gendered significance which can be linked to the traditional order vs. chaos polarity discussed theoretically. However, the words which describe pattern in terms of order and chaos: 'scattered' and 'regular', did reveal significant feminine and masculine gender associations. Scattered and regular become the third gendered pairing which can be associated with pattern on clothing, which is closely linked to the cultural polarities of chaos vs. order and emotion vs. logic.

These three pairings: floral/geometric, curved/angular and scattered/regular will be joined by a fourth pattern feature of scale in Chapter Two. It is apparent that men's pattern tends to be of smaller scale than women's, giving a possible pairing of large scale vs. small scale. This has not been discussed in this chapter as its theoretical basis seems harder to locate, though as will be seen, the larger the scale, the less apparent structure the pattern may have as the repeating element will not be obvious, so a connection with order vs. chaos and structured vs. unstructured seems reasonable. However, there is a contradiction here which will be considered further in Chapter Three; the contradiction is that large scale is often described as 'bold', giving a masculine association in contrast to the feminine 'timid'.

These features of geometric, organic, angular, curved, regularity and scale will be used throughout the thesis and referred to as the 'gendered pattern feature set'. As well as playing a key role in the pattern analysis of Chapters Two and Three, they also help to form some of the crucial considerations in the creation of the design strategy and in the specific design examples demonstrated in this thesis, discussed in Chapters Four and Five. These examples will seek to democratise the binaries and by doing so, bring into question the very nature of commercially printed fabric, which is most often constructed from a repeating, and hence ordered, design.

Chapter 2

Case History: 1968 – 1973

2.1 Overview

The chapter takes the theoretical concepts of gendered oppositional qualities in pattern design, identified and developed into the gendered pattern feature set in the previous chapter, and makes practical use of them in analysing pattern from the specific period of time 1967 to 1973. The intentions of this analysis are: to demonstrate how theoretical discussion may be used constructively to investigate specific forms of visual culture; to show the relationship between the social climate of the period and the popular styles of pattern; to discuss an important historical period, both in terms of culture, gender and style and to provide an insight into the use of pattern from a historical period which will inform my own practice in the design examples.

The chapter begins with a broad discussion on why this period was selected for a case study from both a historical and archival viewpoint. This will assist the reader in understanding the choice made, the legitimacy of making it and how it affected the ensuing research. The motivation for selection of a time period was to look for a moment in which gender roles had been in upheaval, and from which clothes or textiles could be examined. Section 2.2 will examine the significance and relevance of the chosen period in more detail.

The following two sections, 2.3 and 2.4 give a contextualised account of the social and fashion history of the period. The intended sense of 'contextualised' is that a selection of relevant information is provided, rather than an attempt to give a full account of the issues, which would be beyond the scope of this thesis. The relevance of the subjects covered was measured by their general importance to the period and their specific importance in terms of gender.

Section 2.5 gives an account of each of the four archives used, the information available and the challenges each presented. Both textile and mail order catalogue archives were investigated and each presented different types of problems. For example, fabric alone does not indicate end-use; conversely, pages from catalogues, while clearly showing end-use, don't always show the pattern clearly. However, in section 2.6 the resultant pattern analysis will show examples from all the archives, which when brought together provide a substantial and representative sample of the clothes of mainstream young people of the period. The analysis itself breaks down into the dualities discussed in the summary of Chapter One. The findings of this analysis will show how gender differentiations were maintained in a period in which it is often considered that men were wearing feminine clothes.

2.2 Background

As this research is investigating gender differentiation through pattern on clothing, any period of history could have been chosen for investigation. However, the particular interest of the research is in mainstream clothing, or clothing which a large proportion of the populace would have worn, rather than an elite. From this point of view, the starting point for investigation would be around 1750, when mass-produced printed textiles became widely available. However, it was immediately apparent that attempting to investigate pattern over 250 years would not be feasible for this project.

It became obvious very early on how little textual information was available about pattern on clothing, making the project both more exciting and more frustrating. Dress historians tend to concentrate on garment shape and rarely discuss pattern, occasionally mentioning colour or scale. Textile historians, on the other hand, tend to concentrate on fabrics, dyes, processes, repeat structure and motif, but have little to say about end-use. Visits to Courtaulds Design Archive also proved frustrating. Many Toiles de Jouy guard books[1] from the Oberkampf factory are stored there. These guard books are fascinating, but date and end-use is virtually non-existent. While Brédif's (1989) work can help identification, conclusions can be no more than informed guesswork. Similarly, much of the textile collection at the Victoria & Albert Museum has no information on end-use.

To ensure that the fabric investigated was actually used to make garments, the obvious solution was to look at garment collections. The Costume section at the V&A, together with those at The Museum of Costume at Bath and Platt Hall Costume Museums are limited, and could not be seen as representative of any particular period. In particular, costumes conserved tend to be special occasion outfits, rather than every day wear, and are generally from the upper classes. Men's costumes are far scarcer than women's are as 'Men have always been less profligate with their wardrobes than women and require their clothes to be extremely long lasting.' (Rothstein (ed.) 1994: 2)

While undertaking this investigation, however, some features did become apparent which indicated changes in pattern for social reasons. After the French Revolution, Brédif (1989: 96) asserts that Toiles de Jouy clothing patterns 'were based only on linear elements organised in a greater variety of combinations: squares, diamond

[1] Guard Book is the term used for an album of paper fabric designs or fabric swatches

shapes, triangles, occasionally softer ovals and half-circles, with yellow, purple and black as the dominant colours' and that 'graceful floral motifs' were 'cast off' in a show of 'the rejection of a certain kind of society whose constraints were now found unacceptable' (Brédif 1989: 96). Similarly, after the Russian Revolution the Constructivist designers rejected organic imagery in favour of abstract, geometric and mechanical forms celebrating technology and industrialisation (Bowlt in Yasinskaya 1983: 5). This can also be seen in other modernist textiles, where representational forms were eschewed in favour of geometric and abstract patterns (Woodham 1997: 45).

The period ultimately selected 1967 – 1973, is now renowned for the social upheaval and changes in gender roles which occurred and also notorious for the styles of dress in which many feminine signifiers were used in menswear. Though the sixties as an entire decade is associated with this phenomenon, it is quickly apparent from examining the data that the changes in clothing which affected most ordinary people happened in the late 1960s and early 1970s. Green begins his book on the Sixties and Counterculture with a quotation from the novel, *London Blues*, in which he states: 'The sixties, I always think, didn't really get going until about 1964, and didn't end until about 1972 or 1973.' (Frewin (1997) in Green 1998: ix). This is also reflected by the historical segmentation used by two recent histories of twentieth century fashion, one of which contains a chapter from 1968 to 1975 (Mendes & De La Haye 1999) and the other a chapter on the period 1968 to 1972 (Baudot 1999).

2.3 Contextualised Social History

The period from 1967 to 1973 encompasses many of the sweeping changes associated with the 1960s and for many of the population it was the time when some of the more radical changes in appearance and clothing filtered through to the mainstream. The countercultural values of the period: love, peace, nature and anti-authoritarianism are all associated with the feminine, while their opposites have masculine associations. However, we will see that this apparent move towards a feminised society, or at least one in which feminine values were regarded more highly, is a quite superficial one. While liberation and equality were watch words of the period, so was the term 'dolly bird'. The period began in a socially optimistic mood, continuing from the late Fifties sentiment of 'never having had it so good' instilled by then Prime Minister, Harold Macmillan. In a 1993 discussion of the contemporary impact of the 1960s on BBC's *The Late Show*, historian Paul Johnson described the 1960s as 'the last decade when people still had hope' (Johnson in Lee (prod.) 1993: TV), while author Tony Parsons

agreed that the general belief of the time was that things would continue to get better (Parsons in Lee (prod.) 1993: TV). By 1973, an economic crisis was beginning which made the period end with a lot less certainty than it began.

In 1967 both the homosexuality and abortion laws were changed, giving freedom to consenting homosexual men over the age of 21, and women more control over their bodies and lives. The 'summer of love' came in 1967, a time when hippie counterculture flourished along with psychedelia and LSD (Green 1999: 213). Pop festivals flourished at this time and Marwick describes their key features of 'Rock music... nature, love, drugs, and mass togetherness' as contributing to 'the greatest of all the types of spectacle invented in the sixties.' (Marwick 1998: 497). Green suggests that the phrase 'permissive society' was adopted in 1968 to reflect the changing moral codes of a society becoming more liberal (Green 1999: 51). He acknowledges that 'the concept of 'permissiveness had been gathering strength since the late fifties' (Green 1999: 51), but leaves it unclear as to why he identifies this particular year as the crucial one. Underground movements had become widespread among the young middle-classes, starting with CND, and continuing with numerous anti-capitalist and anti-war movements. Rowbotham (2000: 132) remembers the counterculture of the time as 'creating a new kind of public space which was accessible to women'. This space, in the form of underground clubs, 'provided a way of being women which could bypass some of the restricting rules' (Rowbotham 2000: 132).

There were however, signs of the optimism dissipating. Marwick describes 1968 as 'America's Annus Horribilis' (Marwick 1998: 642), a year in which Robert Kennedy and Martin Luther King were assassinated, the Vietnam War was at its peak, and the anti-war demonstrations were intense (Marwick 1998: 642). In the UK, following the work of the Campaign Against Racial Discrimination and while the Race Relations Act was being debated in parliament, Enoch Powell gave his renowned 'Rivers of Blood' speech which led to a rise in popularity of the National Front and an increase in racial attacks (Marwick 1998: 755-756). All these factors can be seen as seeds of the disillusionment that was to follow in the seventies, together with the growing disillusionment of women campaigners who saw their roles trivialised. As the period progressed towards the 1970s, Rowbotham saw that though hippie culture was allowing women more freedom, and men appeared to be giving up some of the 'facets of masculine power', others became more significant:

> The divested trappings of masculinity could, as if to compensate, produce a more exaggerated desire to control women. It was to be this peculiar combination of a new spaciousness in gender identity, and a tighter grip in unexpected places which laid the basis for women's rebellion.' (Rowbotham 2000: 134)

Sexual liberation, for example, was promoted as something positive for both sexes, and did indeed bring some equality for women. However, Marwick questions whether this was really sexual liberation for women, or 'simply enhanced liberation for men, a grand occasion for the even more ruthless sexual exploitation of women?' (Marwick 1998: 680). Certainly, the liberalisation of attitudes towards sex and censorship lead to a proliferation of images of women in theatre[2], advertising, television and film (Wheen 1982: 109). This in turn led the instigators of the women's movement to react against this blatant objectification in the name of equality. Rowbotham (1990: 248) describes the pictures she saw in 1969 as 'images of a distorted manmade femininity'. The Women's Movement used sticker campaigns to protest against this and other issues of equality such as equal pay. Her comments on the focus of the press attention show the frustration of not being taken seriously:

> In opposing a representation of women which we saw as offensive we wanted to express our conception of an alternative, liberatory sexuality. Instead we were caught up in the dominant culture's fascination with women as sexual beings. 'Women's Lib' was titillating. Equal pay was not. (Rowbotham 1990: 249)

Despite these misgivings, some of the previous optimism did continue through 1969, with the first man on the moon boosting the belief in progress and technology, and the Woodstock festival in America being 'the supreme counter-cultural feelgood event' (Green 1999: 436). The Isle of Wight festival the following year is often seen as the beginning of the end of the hippie movement. Problems over the site and tickets caused fans and residents alike to be disgruntled. Some fans refused to pay the entry fee, on the basis that it was against the principles of hippie anti-capitalist culture. Many of the artists went unpaid. Jimi Hendrix, the headline act, gave a mediocre performance, and was dead within a month (Green 1999: 441).

In Britain it was 1970 before women's liberation came to the fore. The first organised conference on Women's issues took place in Oxford (Sharpe 1994: 36) and the same year, continuing their protest against objectification, the women's movement

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[2] The theatre act of 1968 abolished the powers of the lord chamberlain to censor theatrical works, allowing stage productions such as *Hair* and *Oh Calcutta!* to include full nudity. (Hewison 1986: 196)

demonstrated at the Miss World contest, receiving a significant amount of publicity when a bomb exploded under a BBC van (Rowbotham 1990: 248). Germaine Greer published her seminal work, *The Female Eunuch*, and warned in her concluding chapter that it was important to keep the recent changes in perspective:

> ...Neither is it a sign of revolution when women ape men, and men women, or even when the laws against homosexuality are relaxed, and the intense sexual connotation of certain kinds of clothes and behaviour are diminished (Greer 1971: 315).

The apparent liberalisation of the 1960s had not produced concrete changes for women. While on the surface society had become less polarised, Greer told us that the relaxation bore 'no relation to the sway that male-female notions hold in the minds and hearts of real people' (Greer 1971: 315). Though the Equal Pay Act was passed in 1970, it didn't become fully enforced until 1975 (Marwick 1998: 719). Even so, in the first few years of the Seventies, women's liberation and feminism became issues which most people of the time were aware of. The Sixties had also provided women with a sense that they could, and should be treated as equals, which developed into the struggle of the women's liberation movement in the Seventies. The sexual revolution which has been viewed by opposing parties dualistically as either wholly exploitative or wholly liberating for women can reasonably be seen in a more ambivalent light:

> Testimony on sexual liberation in the sixties is less supportive than we have sometimes been led to believe of the position that liberation was purely for males to exploit females. The new freedom for girls and women was real, though so also was a strong determination among males to exploit new opportunities to the full. (Marwick 1998: 804)

Over the span of this time period the social climate changed from one of buoyant optimism to a much gloomier one. A Conservative government was elected in 1970 which was followed by 'a period of increasingly political and economic unrest.' (Hewison 1986: 182). In 1972 Britain experienced power cuts during the miners strike, which became violent with the deployment of 'flying pickets' attempting to prevent coal movements. After thirteen IRA terrorists were shot dead on what is now known as 'Bloody Sunday' the IRA instigated a bombing campaign on the British mainland. The following year the international oil crisis saw oil prices double and marked an economic downturn (Marwick 1998: 752).

The early seventies also saw influential underground magazine, *Oz,* being prosecuted under the obscenity laws in 1971, and the publication's eventual collapse in 1973 (Hewison 1986: 177). Hewison tells us that 'By the time of the collapse of *Oz* the mood

of the underground had changed from euphoria to disillusion.' (Hewison 1986: 177), and Green remarked that 'As the Sixties turned into the Seventies it appeared that freedom had proved too much. People preferred rules...' (1999: 447).

Two of the most salient features of this period in terms of this project are the liberalisation of attitudes and attempts towards equality in many different areas such as sex, sexuality, race and gender and the pervading optimism which accompanied it. It has been shown that sexual liberation was not wholly advantageous to women, and that the resulting objectification of women in the media was one of the contributing factors in the development of the Women's Liberation Movement towards the end of the period. The sixties are widely remembered as a time in which quite dramatic changes in clothing took place. In the next section we will consider the changes in fashion which accompanied these social developments.

2.4 Contextualised Fashion History

As identified in the overview to this chapter, this project is primarily concerned with mainstream clothing for the fashion conscious youth. While counter-cultural movements undoubtedly affect the styles of mainstream clothes, and their effect is important in assessing the social values of the time, the dress of particular groups such as hippies has not been focussed upon in its own right. The liberalisation of society and the embracing of individualisation may be seen as two of the factors which contributed to the breaking down of the conventional fashion system in this period.

Radner uses fashion photography to examine the paradoxes of female emancipation during the period. She identifies the concept of the 'Single Girl', personified by models like Jean Shrimpton and Twiggy, as active and youthful (Radner 2001: 184). She states:

> Both in appearance, waif-like and adolescent, and in goals, to be glamorous and adored by men (in the plural) while economically independent, the Single Girl defines femininity outside a traditional patriarchal construction. At the same time, the Single Girl establishes consumerism as the mechanism that replaces maternity in the construction of the feminine. (Radner 2001: 184)

Using models in outdoor locations for fashion shoots became more popular and the poses used were often active ones, which in simplistic terms may be viewed as an overturning of the active-passive and public-private polarities. However, in reality, and in line with the discussions above, the issues are far more complex. Radner (2001: 196) argues that the active woman portrayed in the period's fashion photography

'more often than not seeks girlishness as the goal of this activity'. Chapter one of this thesis touched upon the links between women and consumption. Radner states that this association has been used as an argument for both emancipation and domination:

> These arguments divide more or less between those who see consumerism as an invitation to own the feminine body as one's self and those who see it as a new form of domination. (Radner 2001: 196)

Similarly, the potential impact of second wave feminism on fashion can be seen as contradictory. On the one hand, as skirt lengths tended to lengthen as feminism gained popularity in the early seventies, it could be seen that this was a direct consequence of feminist protest against the objectification of women. The midi and maxi skirts can be seen as a move towards more 'grown-up' fashion as the women's movement strove to move away from the 'little girl' look of the miniskirt (Mendes & De La Haye 1999: 192). On the other hand, feminists regarded the fashion industry with contempt, which as Steele states 'made them unlikely candidates as fashion trendsetters' (Steele 1997: 282). While Steele gives a range of factors which probably did directly affect the fashionable skirt length of the period[3], she also acknowledges that 'the women's liberation movement was an important phenomenon in the 1970s, which had an indirect influence on fashion' (Steele 1997: 282-283)

The changing skirt length was indicative of other changes in fashion, as the mini skirt of the mid sixties was added to with midi and maxi length skirts, rather than replaced by one of them (Mendes & De La Haye 1999: 192). Many fashion authors identify the late sixties and early seventies as the crucial time in which fashion became pluralistic, and the rigidity of having one 'in' style per season was broken:

> Since the decline in the 1960s of a seasonal 'look' of which women could be sure, mainstream fashion has deliberately constituted itself as a variety of 'looks'. (Evans & Thornton 1989: 59)

This change in fashion can be associated with the more pervasive societal pluralism which was later identified as a symptom of postmodernity. It is also one of the indicators used in analyses which link postmodernity with fashion, as discussed in Chapter One. The skirt length controversy was probably the most significantly debated feature of women's fashion in this period (Steele 1997: 283). Pattern, which was prolific at the time, seemed to arouse no need for great discussion, perhaps due to it

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[3] including de-bunking the myth that skirt lengths rise and fall according to the state of the economy (Steele 1997, p282)

already being regarded as essentially feminine. The counter-cultural hippie movement also impacted on mainstream fashion, with an emphasis on floral and ethnic designs. Package tours and foreign travel became cheaper and more widespread which aided the exotic inspirations of designers (Mendes & De La Haye 1999: 194). Steele asserts that the early 1970s were 'a continuation of late-1960s themes' which she lists as 'conspicuous outrageousness', 'retro fantasies', and 'ethnic influences' (1997: 281).

Pattern was, though, a highly debated topic in men's fashion, which will be discussed further in section 2.4.1. This was the period in which mainstream men's shirts became patterned with designs other than checks or stripe. Florals, paisleys and abstract designs were commonplace. Cole asserts that the more outrageous attire favoured by homosexual men was at least partially responsible for the change:

> By the end of the decade [the 1960s] it was far more acceptable for young (heterosexual) men to wear bright colours, effeminate clothes and even make-up. The age of unisex had dawned. In many ways the styles of dress previously worn by gay men unafraid of flaunting their sexuality had been hijacked by heterosexuals. (Cole in De La Haye & Wilson (eds.) 1999: 150).

Significantly, men seemed to be adopting feminine styles in their appearance. In particular, long hair and patterned clothes became acceptable. The trend towards bright colours and patterns in shirts was fairly short-lived however, and it would appear that by 1975 most men's shirts had returned to being plain, checked or striped[4].

Similarly, in the seventies women's clothes became less overtly feminine. Steele (1997: 281) describes fashion from 1975 to 1979 as becoming 'harsher and more conservative', basing this at the street level on the punk influence of sex and violence, and in high fashion on the 'deliberately decadent style of "terrorist chic"' (Steele 1997: 281). Trousers became acceptable women's wear; according to Steele it was 'the first time in history' that they were really accepted for casual and office wear (Steele 1997: 284).

While it is clear that associations can be made between the social climate and the styles of clothes worn, it is also clear that there cannot be a simple direct correlation from one to the other as many factors need consideration. Superficially, it appears that as the social values of the time appeared more feminine in nature, so did some aspects of men's clothing and appearance, though the archival research below will suggest

[4] This is evidenced by the archival documentation: by 1973 there were no floral or organic designs on men's shirts in any of the catalogue archives discussed below and a greater emphasis on muted colours and more conventional stripes.

that, in terms of pattern on clothing at least, women's wear also moved towards the feminine. What can also be stated is that men's appropriation of femininely connoted garments did not imply that suddenly the bright colours and floral imagery had lost their feminine connotations. This point will be further explored in Chapter Three. In the following section press cuttings from the Van Heusen section of the Viyella archives are used to explore the media reaction to men's appropriation of feminine symbols in their dress.

2.4.1 The Feminisation of Men's Shirts

The articles used in this section are from a collection of press cuttings held in the Viyella archive which range from trade magazines to local newspapers[5]. The quotes and references used give a flavour of the type of commentary made about men's fashion, particularly in the local newspapers which tend to reflect the attitudes of the mainstream public. While pattern and colour for men had become popular in high fashion and counter-cultural groups in the early 1960s, it was not until the start of the case study that widespread changes took place.

Shirts changed dramatically for the youth market in the mid-sixties, but it was not until the late sixties that mainstream shirt manufacturers followed suit, producing slim-fit, coloured and patterned shirts for all markets. In 1967 the Herald Express noted that 'floral shirts are still more or less confined to Carnaby Street and Mayfair' (Anon 1967). By 1969 the *Gloucester Citizen* described Marks and Spencer's decision to stock colourful shirts as 'the birth of a new era in men's wear', continuing with the statement that 'until then frills, flowers and flamboyant hues were considered most safely confined to eccentrics, hippies and queens.' (Anon 1969a). Florals being added to the Van Heusen shirt range was still big enough news at the end of 1969 to prompt the headline 'Florals added to Van Heusen's new 'fashion' range'(Anon 1969b) in trade magazine, *Style for Men Weekly*.

The rise in patterned and colourful shirts was often attributed in the press to the end of the shirt being considered an undergarment. With the advent of central heating in the home and good heating systems in cars the need to wear a jacket all the time was reduced and 'shirtsleeves' became socially acceptable: 'The shirt is thus left exposed, and naturally, it has become a form of expression' (Higginson 1969).

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[5] Please note that most of these references do not include page numbers, as the press cuttings themselves had not recorded this information.

While mainstream shirt manufacturers produced floral and coloured shirts for their established older market, the more exclusive young men's shirt manufacturers expanded into the mass market with bigger sizes for older men. According to *The Daily Express*, only fifteen percent of all shirts sold were now white, compared with sixty-five percent in 1966 (Boyle 1970). By the end of 1970 a woman's column in one local paper was lamenting the fact that plain shirts had become so hard to find (Innes 1970). In other articles, women were hailing the patterned shirts as 'an extension of their own blouse wardrobe' (Millington 1970). In 1971, John Langford, of Langford Shirts, was stating 'Not even a 60 year old director in Stoke-on-Trent wants to go to the office wearing an old-fashioned white shirt.' (Langford in Allen 1971). Traditional geometric patterns for men were also being described as 'old-fashioned' in 1970 by *The Cheshire Observer* (Anon 1970)

Many press articles of the time comment on the 'Peacock-style' or 'Peacock Era' as it became known. Men were not only wearing different shirts, but they were buying more of them; UK sales rose from 52 million to 80 million from 1960 to 1968 according to an article in *The Financial Times* (Gofton 1969). In 1971 the *Sunday Times Business News* told of an 'irate food manufacturer', who blamed falling sales on 'those gaudy peacocks - men who are pocketing wage increases and spending it on themselves.' (Anon 1971a). An article in the Watford Evening Echo saw men's interest in fashion and the lengthening of women's skirts as indications of a direct reversal of the gender roles stating:

> There's no doubt about it. The fashion game's gone topsy-turvy. For while the fair sex are busy covering their curves in the all-concealing midis, with the emphasis this year on black or darkest aubergine, their menfolk are going all out for figure hugging outlines and riotous patterns and colours. (Grenby 1970)

The first signs of talk of a move away from 'the femininity of imitation jacquards to small checks...' (Anon 1971b) is pronounced in *The Guardian* in May of 1971 in an article entitled 'Prophesy and Gloom for the Peacock'. In 1972 *Men's Wear* described the pattern trend as being 'a swing back to classic elegance' with stripes and checks as the key patterns (Crome 1972). In America, the fashion director at Bonwit Teller was quoted as saying 'Men have got the peacockery out of their systems. They feel it's time to return to good taste.' (Zarem in Anon 1972). At the same time, a trade magazine supplement on shirt trends stated that '...big bold abstract designs and prints take a back seat to smaller and neater patterns, favouring small geometrics, circle and spot prints, checks and abstract motifs.'(Goldhi 1972), continuing by stating that stripes are

also returning to fashion the article states that this is 'consistent with the desire for dignity in design' (Goldhi 1972).

While the language used to describe patterned and colourful shirts occasionally refers to femininity, and more often to effeminacy, there is some more subtle use of adjectives in these articles which correlate with the gendered polarities discussed in Chapter One. For example words such as 'gaudy' are generally associated with a feminine, over-decorated lack of taste, while 'riotous pattern' suggests a lack of order, or chaotic state. In contrast, when pattern veers back towards the masculine, phrases such as 'classic elegance' and 'dignity in design' suggest good taste and 'neater pattern' suggests order and control. These concepts will be further explored, following the next section which details the archival visits and data collection.

2.5 The Archives

The archives visited were Viyella, Grattans, Kays and Freemans, each of which will be discussed individually below. Viyella was a cloth and clothing company[6], whose archive of fabric, brochures and press cuttings held particular delights and frustrations, which will be detailed below. The mail order clothing catalogue archives proved beneficial as a resource, though they too held some disadvantages. The advantages over the Viyella archive were that: it was immediately apparent which gender the patterns were intended for as the garments were photographed on models; most of the companies contacted had a complete archive of the catalogues; and that the desired social group of young working and lower middle class customers was amply provided for. The disadvantages were that none of the companies contacted retained any sales information for the period, making the popularity of any particular garment impossible to judge and that the small size of the garment photographs made investigation of pattern detail problematic.

2.5.1 The Viyella Archive

Viyella International Branding, based at Somercotes, Derbyshire, holds the Viyella archive. At the time of my visits in 1997 and 1998, the archive had not been catalogued or evaluated. It was essentially a room full of fabric and a room full of documents. The room full of fabric contained fabric samples of most of the printed and woven fabric produced by the company from the 1950s to the late 1980s when cloth

[6] The Viyella brand still exists, now only producing women's clothing rather than cloth

production ceased. Most of these samples are approximately half metre lengths. Corresponding sample books chronologically record each fabric design, sometimes, but not always, giving details of customer, end-use, season and year. By matching sample books to fabrics it was possible to ascertain that some fabric was missing, in particular bundles from 1972 and 1973.

It is assumed that all of the fabric was either intended for garment manufacture, or sold by length in haberdasheries for the home dressmaking market[7]. The fabric was bundled chronologically, but without distinction of end-use. Hence, within one bundle there was fabric for men's shirts, women's dresses and blouses, children's wear and piece goods, and an enormous range of design styles. This made it impossible to extract one or two styles which 'sum up' a period.

The fabrics produced for garments were obviously designed for particular markets, and there are specific brands such as Ladies Pride and Viyella House that have been identified. No marketing information is available at Viyella, though magazine advertisements and shop brochures give some indications. Fabric sold as piece goods is even more difficult to place in the market, though it may be assumed they were mainly intended for women's garments as this was the largest part of the home dress-making scene. Advertisements for Viyella fabric were placed in women's magazines, often with photographs of models wearing outfits made from the fabric, which can help with market placement. Adverts also appeared within paper pattern catalogues, such as Vogue International Pattern book, Simplicity patterns and Butterick, with Viyella fabric used to make particular garments.

With hindsight, the room full of documents proved more useful than the fabric itself, as advertisements, brochures and press photographs exist which show the fabrics fashioned into garments and worn by models. These photographs provide evidence of gendered end-use of the fabric in the same way as the mail order catalogues do, which the fabric alone cannot. As well as these images, other items of particular interest were the scrap books of men's fashion articles cut from both the national and local press for the Van Heusen shirt company, which later became part of the Viyella group. These articles provided the sources for the above discussion of the feminisation of men's shirts. Unfortunately, none of the Van Heusen shirt fabric is held in this collection.

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[7] Known in the trade as piece goods

The Viyella archive provided a useful starting point for data collection and also highlighted the challenges of attempting to analyse this type of data. The work done resulted in a useful collection of fabric and other samples and a more strategic view of how to proceed with further archival work, both of which will be discussed in detail in the following sections.

2.5.1.1 Fabric Investigation

The aim of the investigation in the Viyella archive was to identify and record fabric designs used specifically for clothing, where end-use could be attributed to specific gender. Much of the fabric in the Viyella archive cannot be identified in any way other than year of production. Three methods were used to select particular fabric in which gender and end-use could be ascertained: fabric used in available garment and piece-goods advertisements; fabric in the sample books indicated as for either men's wear, women's wear or a particular brand label, e.g. Ladies Pride; and fabric specifically mentioned in documents relating to strategic retailing of piece goods.

Eighty fabrics produced between 1968 and 1973 were selected using these criteria and photographed. Selected information, including gender, year, repeat size and number of colours were recorded in a database, which easily cross-references to both the photographic collection and copies of original advertisements and brochure pages.

2.5.1.1.1 Difficulties

Identifying the market has been the single most difficult factor in analysing the Viyella archive. Today's perception of readership for individual magazines may not reflect the true nature of the time. Most of the Viyella and Van Heusen shirt advertisements show men who appear older than would be usual for adverts today, and have not had the same level of grooming or styling. However, I would suggest that this is largely because men did not become the target of consumer products in the way women were until the 1980s (Beynon 2002: 102). A 1970 press cutting found in the Van Heusen collection makes direct reference to the lack-lustre performance of a British male fashion show, saying 'Only in Britain is a men's fashion show passed off as a pantomime or a cabaret or a village fete Morris dancing contest' (King-Deacon 1970). Also, the male youth market was only just starting to emerge. The images of youth in the late sixties with which we are continually bombarded are not ones that have personal resonance for many of the people who were emerging as adults at the time. Working class youth did not have the same ability to 'drop out' as middle class youth (Peel in Lee (prod.) 1993: TV). The liberalisation of the sixties filtered through to the

lower middle and working classes as the Seventies progressed. The Viyella archive provided a source of fabric intended for garments worn by a middle class majority, rather than a highly fashion aware minority.

2.5.2 Mail Order Clothing Archives

2.5.2.1 Grattan's Catalogues

Grattan's began selling clothing through catalogues in the 1920s and are still in business today. They have maintained an archive at their Bradford headquarters, with copies of all their catalogues up to present day. Unfortunately, once again, they have kept no sales or marketing information for this period. The marketing department were, however, happy to confirm their market at the time as being working and lower middle class.

Two catalogues per year are produced, Spring/Summer and Winter. Until 1972 the catalogues are organised in a similar manner, starting with a section entirely on dresses, with particular subsections for petite, outsize and 'the young line', presumably for teenagers. The equivalent 'young line' for men's fashion does not appear until 1969. After 1972 the clothes are intermixed making direct comparison, of, say, the number of patterned dresses that season, somewhat more difficult. Visual data was collected for spring/summer 1968 and 1969.

2.5.2.2 Kay's Catalogues

Kay's catalogues are based in Worcester and now owned by the larger, Manchester based, GUS. They hold all of their catalogues back to 1965 in the marketing department, though 1971 was missing on my visit. During the period of investigation, each catalogue has a 'young fashion' section for women, and it was this that was studied. In 1972 this was supplemented by a 'young miss' section that appears to cater to the pre-teen and younger end of the teenage market. There is no equivalent 'young fashion' section for men until 1969. The number of available white shirts in the catalogue reduced from fourteen to six between 1968 and 1973.

2.5.2.3 Freeman's Catalogues

Freeman's catalogues are London based, and had all of the relevant catalogues available on my visits. Younger women's clothes are separated out from the rest of women's fashion in a section entitled 'Freeman's Scene'; this was supplemented in 1973 with a 'junior scene' for pre-teenager and younger teenagers. The same format is

used for young men's clothes, though by 1970 this section has the name 'Show Stoppers'. By 1972 the men's shirts in the main part of the catalogue were also frequently patterned, and these too have been recorded. Between 1968 and 1973 the number of plain shirts available in the main section reduced from twenty seven to nine, while the number of available plain white shirts reduced from twenty to five.

2.5.3 Data Recording

All the fabric samples collected for the project were recorded photographically, including a ruler as an indication of scale. In most cases one photograph was used to indicate the pattern and its repeat structure and another to show smaller samples of each of the colourways. The advertisements and brochures were either photographed or photocopied on a colour copier. All the mail order catalogue data was photographed, though this did lead to some poor quality images due to problems with flash and the large format catalogues being unable to lie flat on a surface. All the photographs and photocopies were catalogued with index numbers and details such as intended gender, year, source, size of repeat and description. These details were then recorded on a computer database[8]. The images were not digitised for the database as it was felt this would require too large an amount of computer storage, and would form a time-consuming activity for little reward. In total, between seven and eight hundred items of fabric and garments were analysed for the project[9].

2.6 Pattern Analysis

The data from the archives clearly shows that pattern was popular for women's wear throughout the period, and that it became more popular for men as the period progressed, though it was becoming more restrained by the end of the period. We have already seen in Chapter One that decoration and pattern have had female connotations since at least the late nineteenth century. The very use of a large amount of pattern in men's clothes could, therefore, suggest a move towards femininity in men's dress. This assertion is supported by the press accounts of men's fashion in this period.

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[8] The database can be found on the accompanying CD-ROM

[9] The exact figure is not recorded as many of the catalogue pages contained more than one garment, but logged in the database as a single entry. This figure of 700 is a conservative estimate, assuming each photograph contains only two garments.

Information on menswear was far less readily available than women's wear, making any form of quantitative analysis difficult. However, the theoretical analysis in Chapter One has already provided the motivation and justification for providing a qualitative analysis using the previously defined gendered oppositions. The analysis considers features of the pattern and their masculine or feminine implications. Rather than attempt to give a gendered label to a particular pattern, the analysis will provide an account of the gendered features which will be considered in terms of their use as women's or menswear and in relation to patterns available for the opposite gender.

The gendered pattern features are: scale and regularity, together with the adjectives angular, curved, geometric and organic. This is the set identified through a combination of the theoretical work in the previous chapter, and an initial investigation of the data for this study. While angular – curved and geometric – organic may be viewed as polarities[10] with the masculine being represented by the left hand poles, scale and regularity are usually viewed as continua from small to large in the first case, and from regular to irregular in the second. In a similar way, however, the extreme left of the continuum may be considered the most masculine. For this study, it is more useful to consider all the qualities as continua as a pattern may have a combination of organic and geometric elements, or angular and curved elements. Hence the following sections for discussion are scale, angular-curved, organic-geometric and regularity. One final section will discuss the use of the same pattern for garments of both sexes, which seemed to be quite popular within the period. All of the previous work is utilised to provide an analysis of the gendered qualities of these patterns and their overall significance to the period.

Colour is obviously very important in the gendering of clothes, and mention was made in the previous chapter of dark, 'serious' colours being associated with the masculine while light, pastel, and 'frivolous' colours are associated with the feminine. Harvey (1997: 195) asserts that 'Colour dies in menswear in the nineteenth century, leaving colour and brightness to women.' As will be shown below, this period is one which proves anomalous to that statement. However, Harvey, in his study of the use of black in men's clothing, acknowledges that it is beyond the scope of his study to consider the 'whole enormously abundant subject of the significance of colours... especially in women's dress' (Harvey 1997: 195). It is also beyond the scope of this research, where

[10] Particularly in textile design terms, where a pattern would usually be labelled as either organic or geometric, even if it had some of the opposing qualities.

the emphasis is on other pattern features, to provide a full analysis of colour significations. Rather than provide a separate section in which colour is discussed, its effect in masculinising or feminising a pattern will be discussed in conjunction with the other qualities.

The examples shown are representative of, or where appropriate at odds with, the data as a whole, and through examination of them it will be demonstrated that, while men's clothes in this period do shift towards the feminine, they usually retain some masculine-associated features, while the feminine features in the pattern on women's clothes often became more heightened.

2.6.1 Scale

The association of large scale pattern designs with women seems somewhat contradictory. Large designs as often described as 'bold', while small motifs may be called 'timid' in design terms, but bold-timid is an opposition which readily maps to masculine–feminine in our culture. However it is quite clear, both anecdotally and from examination of evidence that, at least throughout the twentieth century, pattern on women's clothes has had the tendency to be larger than that on men's clothes. In practical terms, this could be explained by the relative size of garment, a dress giving a larger expanse of fabric than a shirt; however during this period very short dresses and blouses used very large patterns. It is also possible, as mentioned in the summary to Chapter One, that the nineteenth century move away from pattern on men's clothes made a small, less visible pattern more acceptable than one of large scale, which would almost certainly be more visible, and hence appear more 'decorated'.

In the sample data, over one third of the patterned women's garments and fabrics contained motifs greater in one dimension than ten centimetres, which is the criterion used by this study to define a large pattern. It is not based on the repeat size of the pattern. The repeat unit may contain many small motifs, which, while it may look less ordered than a smaller repeat, will not have the quality of a 'big pattern' which is the identifiably feminine quality sought in the study.

Figure 2-A to Figure 2-E show a selection of women's garments available over the six years of the study period that display large-scale patterns. They also demonstrate that both long and short dresses were produced in these large patterns. All of the women's garments contain patterns consisting mainly of curved motifs, many of which are organic or floral in nature while others are abstract. Most of them have also used quite a wide range of colours within the designs which adds extra emphasis to the scale of

the pattern, as does the use of flat colour[11] which makes individual large motifs more immediately obvious. The dresses Figure 2-B are good examples of these features; on the left the pink flower is extremely obvious, each petal being nearly as large as the model's head, while on the right the colour range adds emphasis, particularly the white curved lines which surround areas of black background and smaller circular motifs.

Figure 2-F to Figure 2-I show some of the largest scale men's patterns in the same period. Though some of these patterns are as large as the female ones, they are generally smaller. Also, none of the men's patterns use large shapes of flat colour, which have been identified above as increasing the feel of scale. The men's patterns tend to consist of smaller individually coloured sections and more intricate lines, which, arguably lessens the impact of scale. Similarly, most, but by no means all, of the men's patterns are presented in a limited, often tonal, colour range, which also lessens the impact of scale. The pattern shown on the right hand side of Figure 2-G demonstrates the use of motifs which break down into smaller sections and have thinner and less well-defined outlines, all of which lessen the effect of scale. If the circular shape in the top right of the shirt is taken together with the vertical leaf or stem below it can be identified as a motif comparable in size to the model's head. This may in turn be viewed as comparable in size with some of the motifs on the women's pattern on the left of Figure 2-A, which appears much larger. The shirt on the left of Figure 2-G illustrates a wide colour palette, but the effect of scale is lessened through the application of different colours to small areas, while the shirt on the left of Figure 2-H demonstrates the lessening effect through a tonal palette in which no part of the motif is particularly prominent. Many of the men's designs use the paisley motif, which despite its organic nature has some traditionally masculine associations[12].

In all these garments it can be seen that elements other than scale are contributing to their overall masculine and feminine qualities. All of the examples of women's garments show other femininely associated features such as curves, organic motifs and a wide colour palette. While some of the men's garments illustrate some of these features, the scale is generally less, the colour palette more subdued, the motifs designed in such a way as to lessen their impact and to give some traditionally masculine connotations.

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[11] Flat colour implies a single colour is used with no gradation or tonal change

[12] Small paisley motifs have been widely used for men's dressing gowns and ties, providing 'an acceptable dash of colour and design' for the man 'who is a very conservative dresser' (Meller & Elffers 1991: 396)

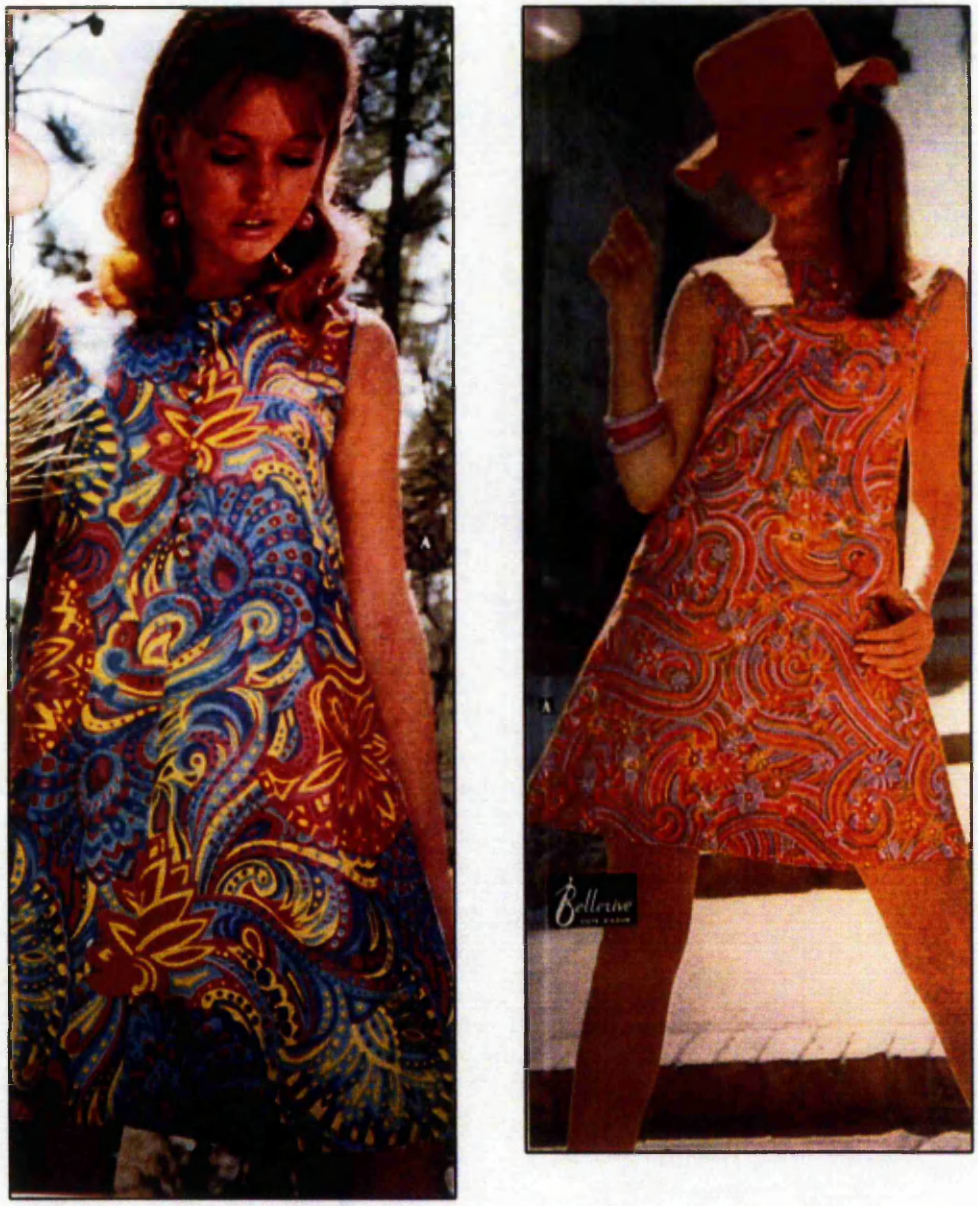

Figure 2-A: 1968 Large Scale Dresses from Grattan's Spring/Summer Catalogue

Figure 2-B: 1970 Large Scale Dresses from Freeman's Spring/Summer Catalogue

Figure 2-C: 1972 Large Scale Dresses from Freeman's (L) and Kay's (R) S/S Catalogues

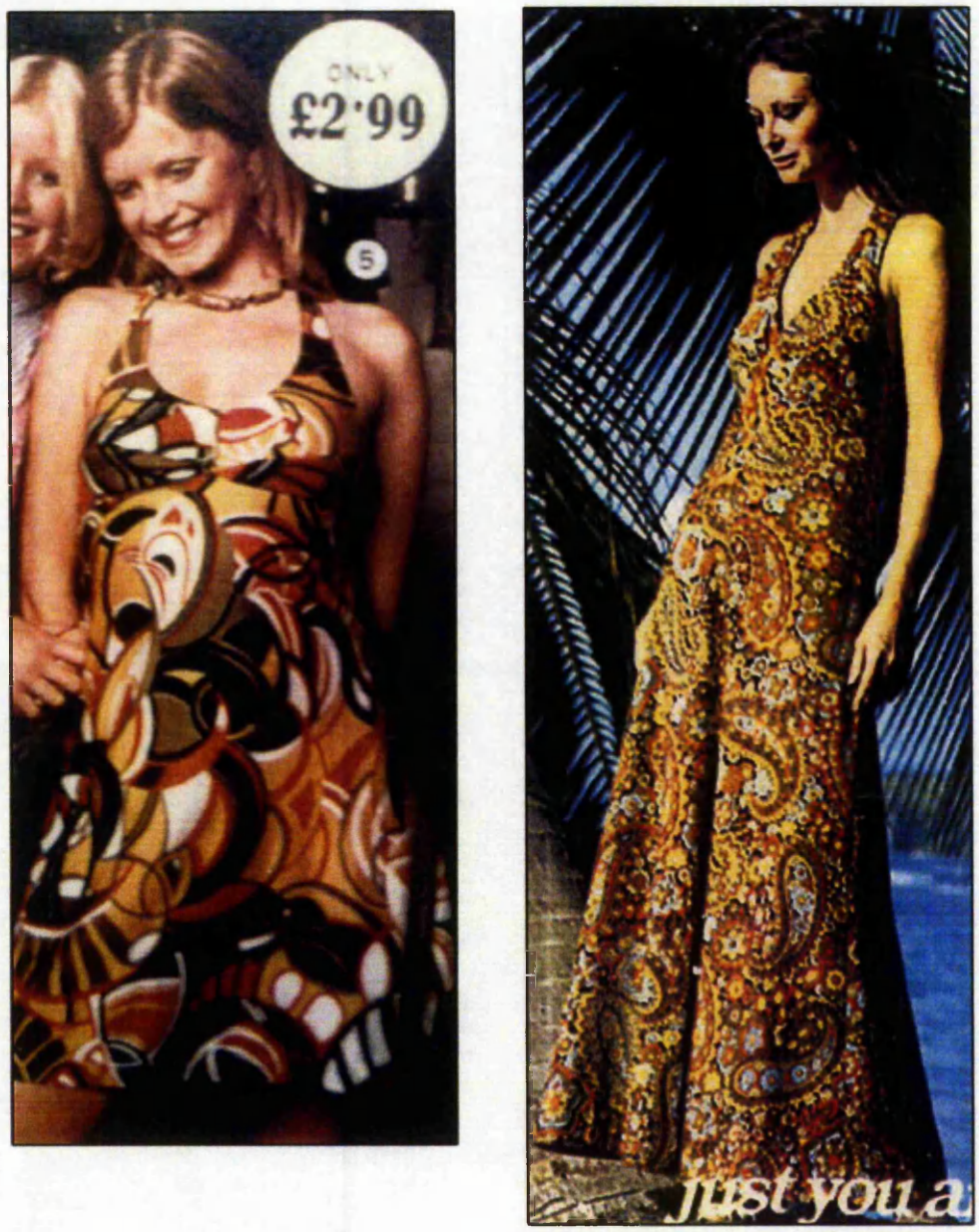

Figure 2-D: 1973 Large Scale Dresses from Kay's S/S Catalogue (L) and Viyella Advert (R)

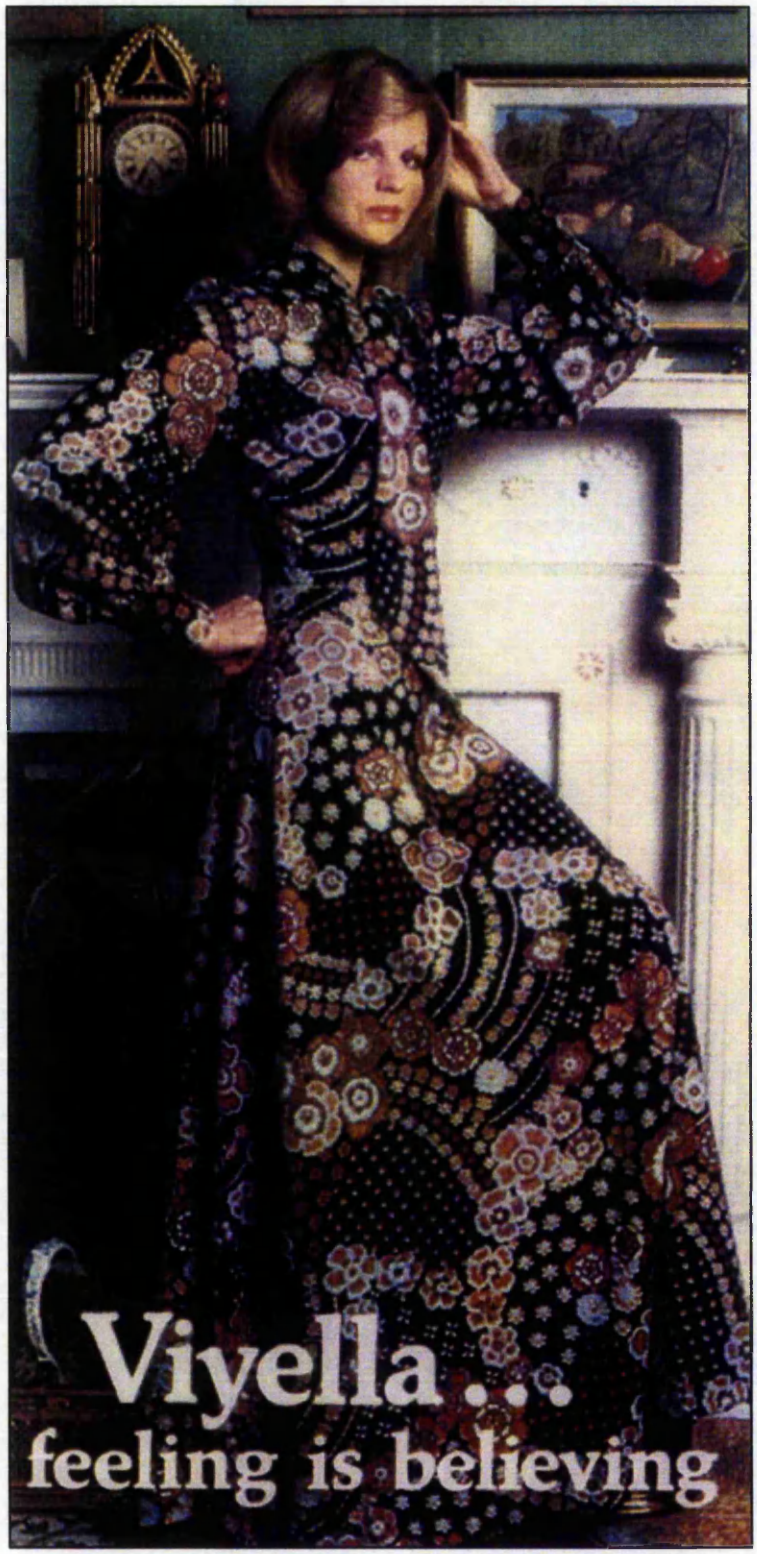

Figure 2-E: 1973 Large Scale Dress from Viyella Advert

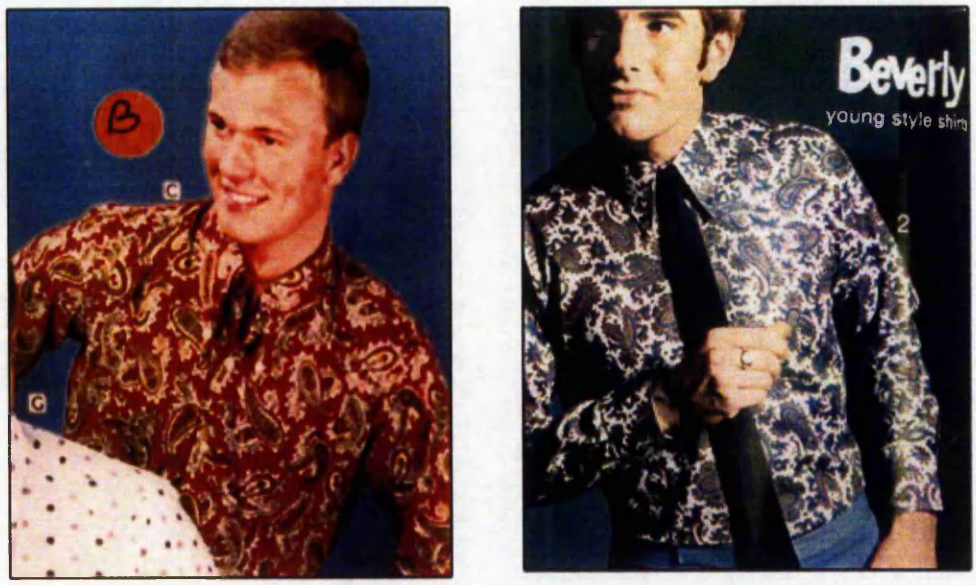

Figure 2-F: 1968/9 Large Scale Shirts from Freeman's 1968 (L) and Kay's 1969 (R) S/S Catalogues

Figure 2-G: 1970/71 Large Scale Shirts from Freeman's 1970 (L) and Viyella 1971 (R)

Figure 2-H: 1971 Large Scale Shirts from Viyella (L) and Freeman's S/S Catalogue (R)

Figure 2-I: 1972/3 Large Scale Shirts from Kay's S/S catalogues 1972 (L) 1973 (C & R)

2.6.2 Angular - Curved

As identified in Chapter One, angularity has masculine associations, while curves have feminine ones. For the purpose of this study, a definition of angularity was constructed in which it was described as being 'a pattern whose motifs comprised mainly straight edges, lines and angles'. All of the large-scale women's and men's patterns shown in Figure 2-A to Figure 2-I demonstrates curves and none angularity. The archival data showed patterns containing curves to be much more popular throughout the period for clothes intended for both sexes. This section will, hence, concentrate on the somewhat anomalous angular designs. However, it should be noted that these men's shirts were not the norm of those appearing in catalogues at the time, particularly those from the sixties, where most shirts were simply plain, checked or striped. Stripes and checks which may be considered traditional in shirting, with their masculine associations, have largely been omitted from the discussion because, as was pointed out in section 2-11,

they were not considered to be fashionable at this time. However, all of the examples shown here in Figure 2-J to Figure 2-L display some form of striped or checked quality. In particular, the left hand image in Figure 2-J shows a plain striped shirt from the 1969 Kay's catalogue which is evidently intended for the young fashionable male. In this case, it is predominantly the colour of the shirt which makes it unusual.

The patterns shown in these examples represent most of the collection of angular men's patterns; however, many of the patterns that appear angular in the first instance are in fact made up of curved motifs. Only the shirts on the right of Figure 2-K and Figure 2-L have patterns consisting solely of straight lines and angles. The others all combine straight lines with curves, or present the angular shapes in such an arrangement as to give the impression of curves, particularly the shirt on the left of Figure 2-L, whose motifs take on the appearance of snow flakes or stylised flowers.

The examples in Figure 2-M represent the two of the very small number of dresses analysed which fitted the criteria for angularity, aside from some simple stripes and checks, and those displayed in the geometric – organic section below. Both of these examples are from 1968 and can perhaps be seen as examples of the outgoing trend of bold geometrics for women's wear. Both also display other feminine characteristics: they are large scale, use a wide colour palette and large areas of flat colour, and the dress on the left shows a very unstructured design. While all of the non-striped men's shirts in this section may also be described as geometric, these dresses would not normally be described this way.

The limited number of examples of angularity show that it was not a prominent feature in pattern for either sex within the period, though men's pattern still contained a much larger selection of stripes and checks than women's pattern. Where used in male pattern, this masculine attribute has been feminised in some way. In the examples below, this is either by the mixing of curves, the creation of florals, or in the case of the shirt in the right of Figure 2-K, the use of more feminine colour – pastel blues and pinks. Angularity in pattern for women is noticeable through its absence. In the cases it has been used, the feminising features described in the previous section have been used to lessen the effect of this masculine attribute.

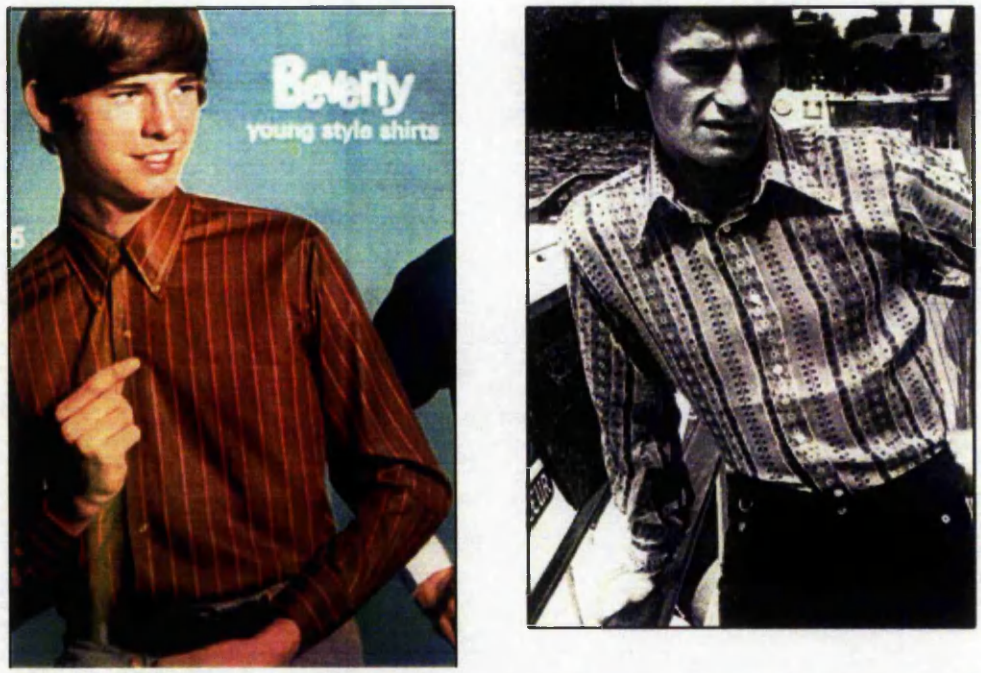

Figure 2-J: 1969/70 Angular Shirts from Kay's S/S Catalogue 1969 (L) and Men's Wear Magazine 1970 (R)

Figure 2-K: 1971 Angular Shirts from Freeman's S/S Catalogue (L) and Viyella Advert (R)

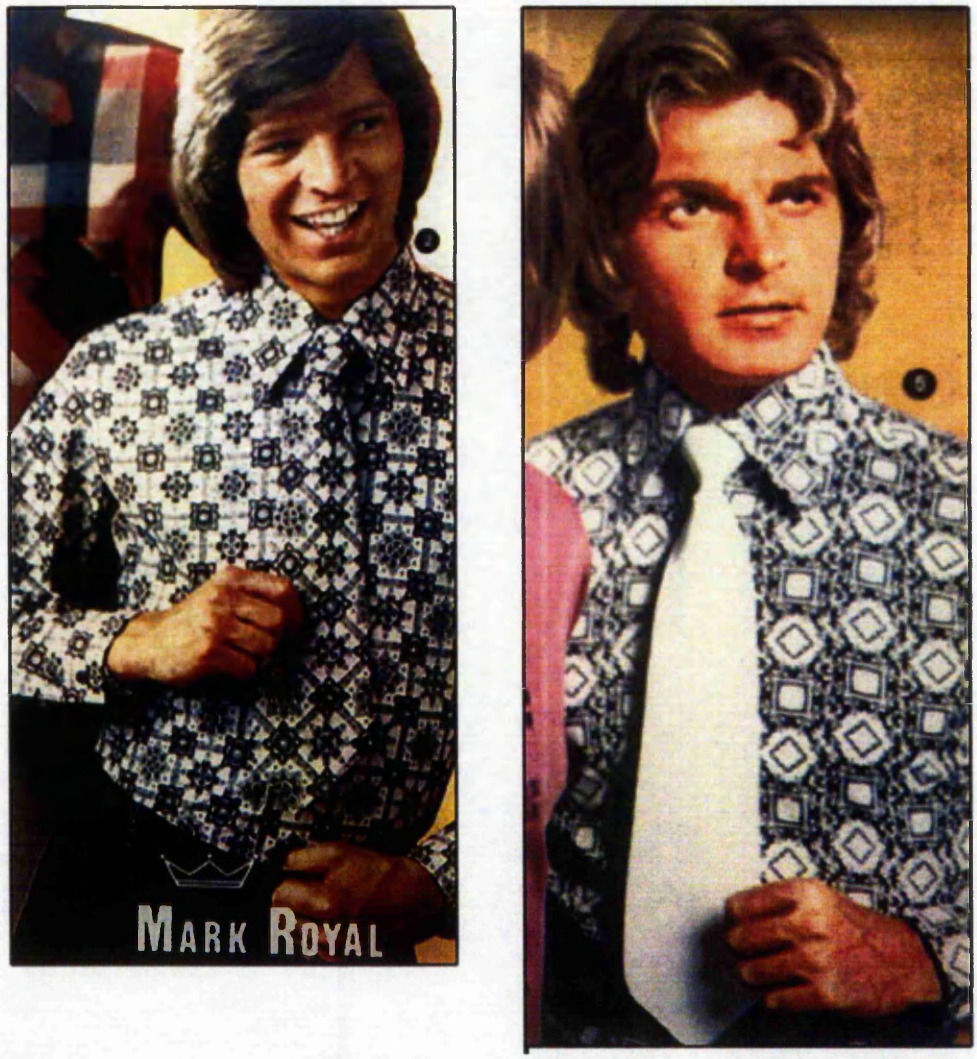

Figure 2-L: 1972/3 Angular Shirts from Kay's S/S catalogue 1972 (L) and 1973 (R)

Figure 2-M: 1968 Angular Dresses from Freeman's (L) and Kay's (R) S/S catalogues

2.6.3 Geometric - Organic

A geometric pattern is defined within this study as one in which the motifs are mainly geometric shapes such as circles, triangles, squares and lines, usually arranged in an orderly fashion. Organic is defined to mean a pattern consisting mainly of identifiable, (however stylised), natural elements such as flowers, leaves, stems, etc.

The angular - curved continuum has many similarities to the geometric - organic one, though there are also discrepancies. For example, a design consisting solely of circular motifs would necessarily be described as curvaceous, and the circle is attributed to the feminine. However, when presented in a particular structured way, the design may well be described as geometric. Examples of this can be seen in the shirt on the right of Figure 2-O and on the left of Figure 2-P. While the designs display geometric and regular qualities, the curves of their structure add a feminising element, which is reinforced through the use of femininely associated pink colouring of the latter design.

The scale of the geometric patterns on men's garments analysed for this project is usually classified as small[13]. An exception to this is the shirt on the left of Figure 2-N, which has a bold circular pattern enclosed in squares. The motifs on this design are probably between 8 and 10cm. However, it is obvious from the way the shirt is worn that it is intended to be very casual, and would have probably been quite daring for most men. This can be seen by the lack of tie, wearing the shirt over the trousers, the open neck and tie belt, all of which can be linked back to traditional robes or smoking jackets which were worn around the house, rather than in public. The pattern to the right of Figure 2-P is somewhat larger. Here the diamond grid structure is tempered by curved lines and organic motifs, which may be representative of flowers or thistles. In the larger scale shirts, the masculinity of the geometric design is offset by the femininity of the pattern scale. In the smaller geometrically patterned shirts, the masculinity of the design is often offset by the use of feminine colours and pastel shades.

Women's geometric designs are fairly scarce in the data. Figure 2-Q to Figure 2-S shows most of the dresses which fit into the definition completely. As with the women's angular patterns, the dresses in Figure 2-Q from 1968 and 1969 seem to be leftovers from the earlier geometric trend in women's fashion, and are both from the sixties. The dress on the left of Figure 2-S, though fitting into the geometric definition,

and providing an highly ordered pattern, can also be viewed as floral, as the geometric shapes are made into flower-like motifs. The dress in Figure 2-O by contrast comprises only simple geometric shapes, but they are placed in an irregular fashion which displaces the masculine geometry of the design.

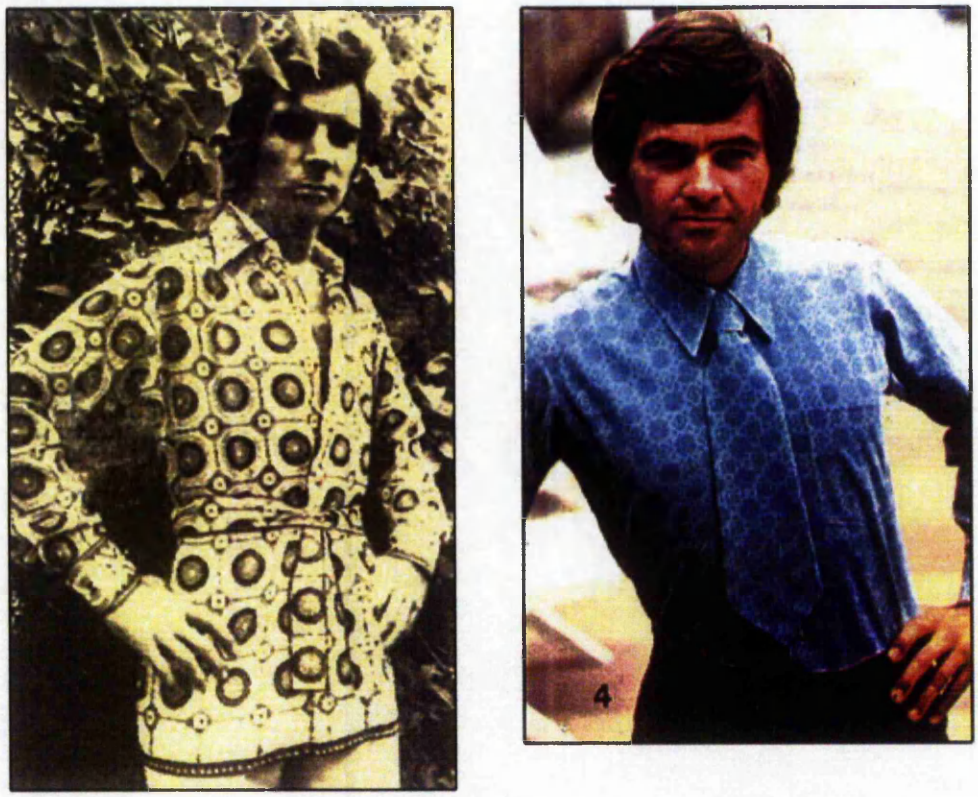

Figure 2-N: 1970/1 Geometric Shirts from Viyella 1970 (L) and John Morgan in Men's Wear 1971 (R)

[13] According to the criteria of the project, this requires most of the individual motifs are less than 2cm in any dimension, see Appendix for full description of pattern categories

Figure 2-O: 1971/2 Geometric Shirts from John Morgan in Men's Wear 1971 (L) and Viyella 1972 (R)

Figure 2-P: 1973 Geometric Shirts from Kay's (L) and Freeman's (R) S/S catalogues

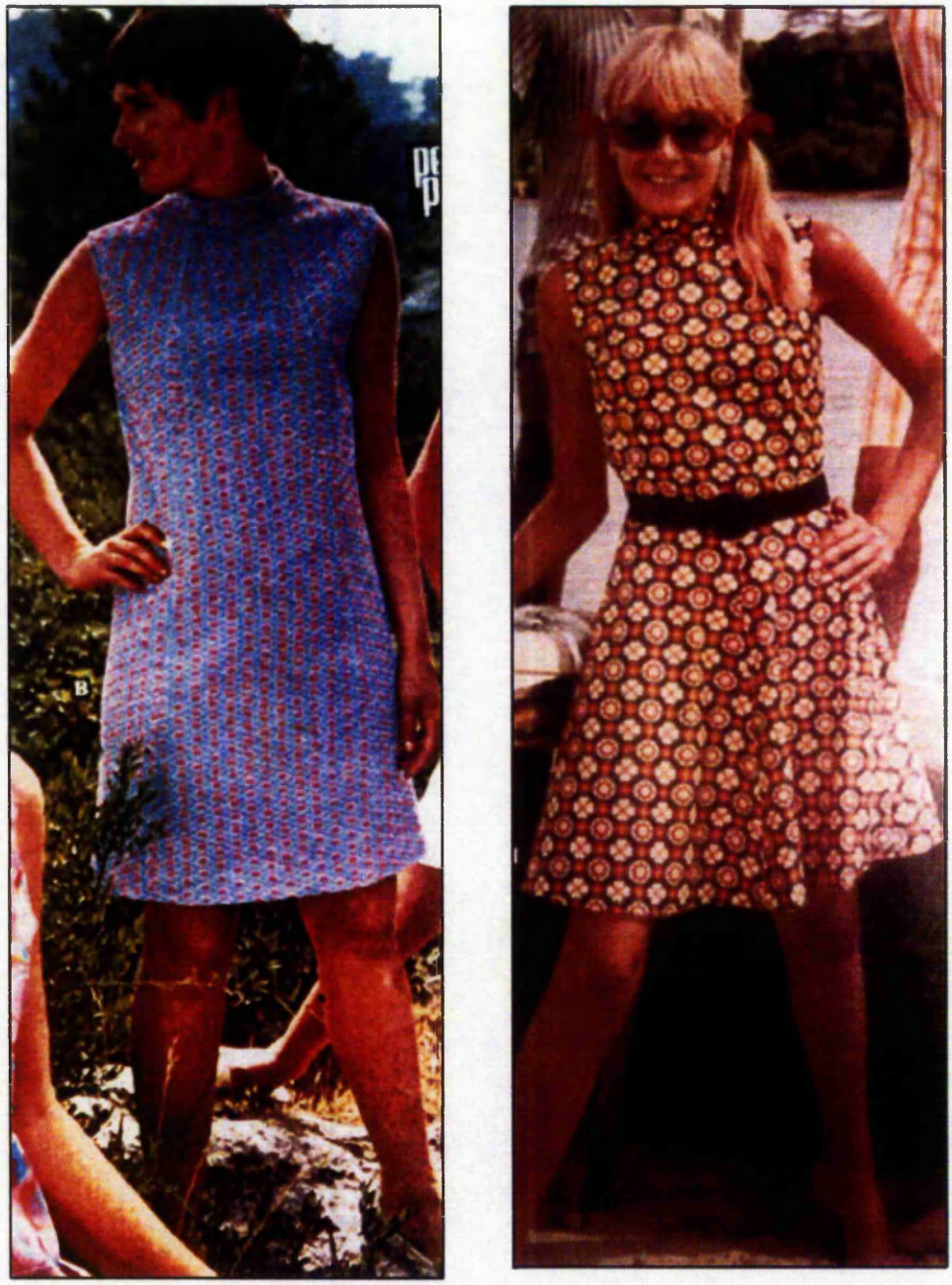

Figure 2-Q: 1968/1969 Geometric Dresses from Grattan's 1968 (L) and 1969 (R) S/S Catalogue

Figure 2-R: 1972 Geometric Dress from Viyella

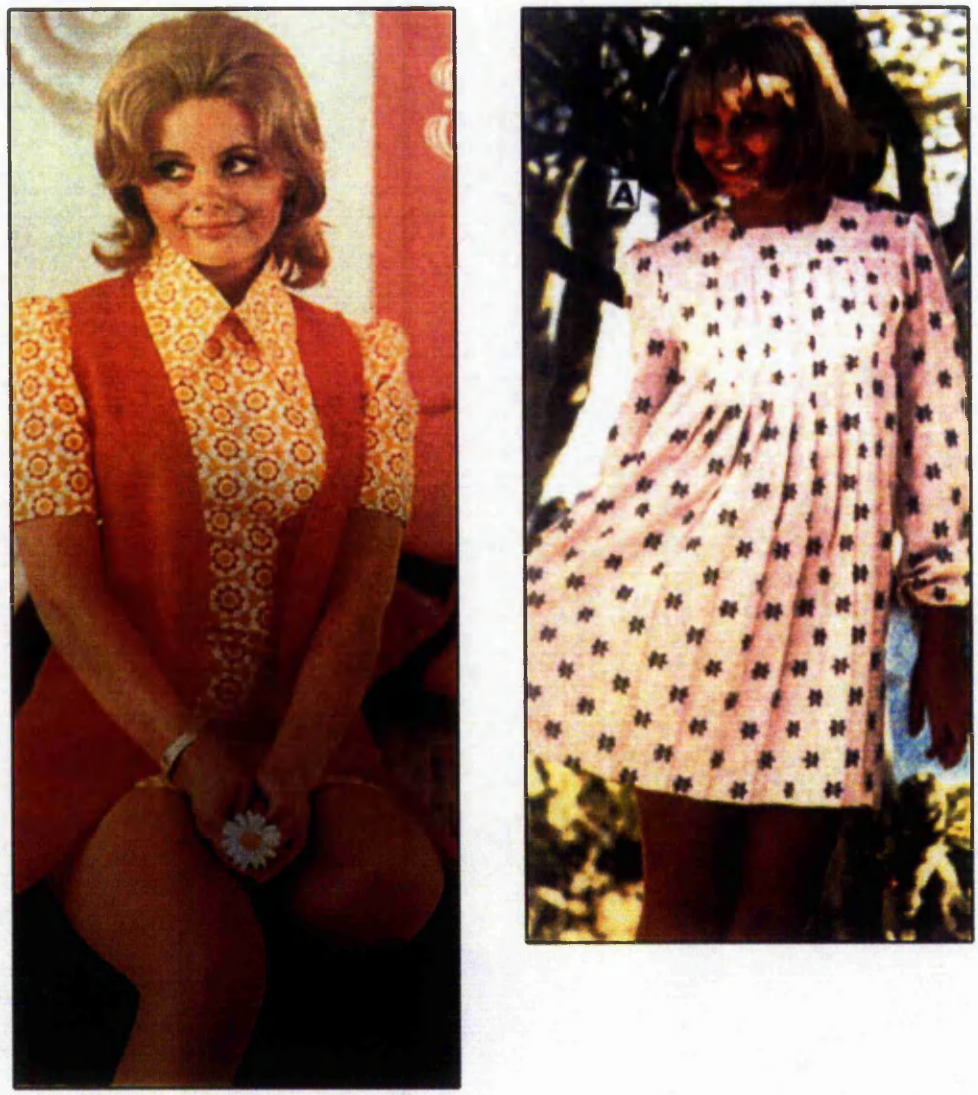

Figure 2-S: 1972/3 Geometric Dresses from Kay's 1972 (L) and Freeman's 1973 (R) S/S Catalogues

The majority of women's pattern in the data was of an organic, mainly floral nature. Many of the large-scale examples in Figure 2-A to Figure 2-E demonstrate this, so separate organic examples have not been included. All of these large-scale examples of women's pattern demonstrate an unstructured, irregular nature, which will be considered further in the next section. Other examples of floral patterns on dresses can be seen in Figure 2-Y and Figure 2-X which display regular qualities, though these are far fewer in number than the irregular designs.

Some examples of organic designs on men's shirts were displayed in the large scale examples above, particularly on the right of Figure 2-G and the left and centre of Figure 2-I. Other examples are shown in Figure 2-T and Figure 2-U below, all of which are small or medium scale. The colouring of most of these designs is tonal and the scale is generally much smaller than that of the women's patterns, lessening the

impact of the organic designs. This is particularly true in the cases where feminine colouring has been used, for example the right hand shirt in Figure 2-T and the left hand shirt in Figure 2-U. The latter also displays a more regular pattern. The larger scale organic patterns for men all display darker, more masculine colours, particularly brown.

Overall, geometrics in women's pattern were uncommon, and where they are present are tempered by using curves, flower-like motifs, or irregular placement. Geometrics in men's pattern appear to have been feminised either by colour, larger scale, or less regularity in placement. The floral designs in menswear are all smaller in scale than those in women's wear, and generally use a more limited colour palette.

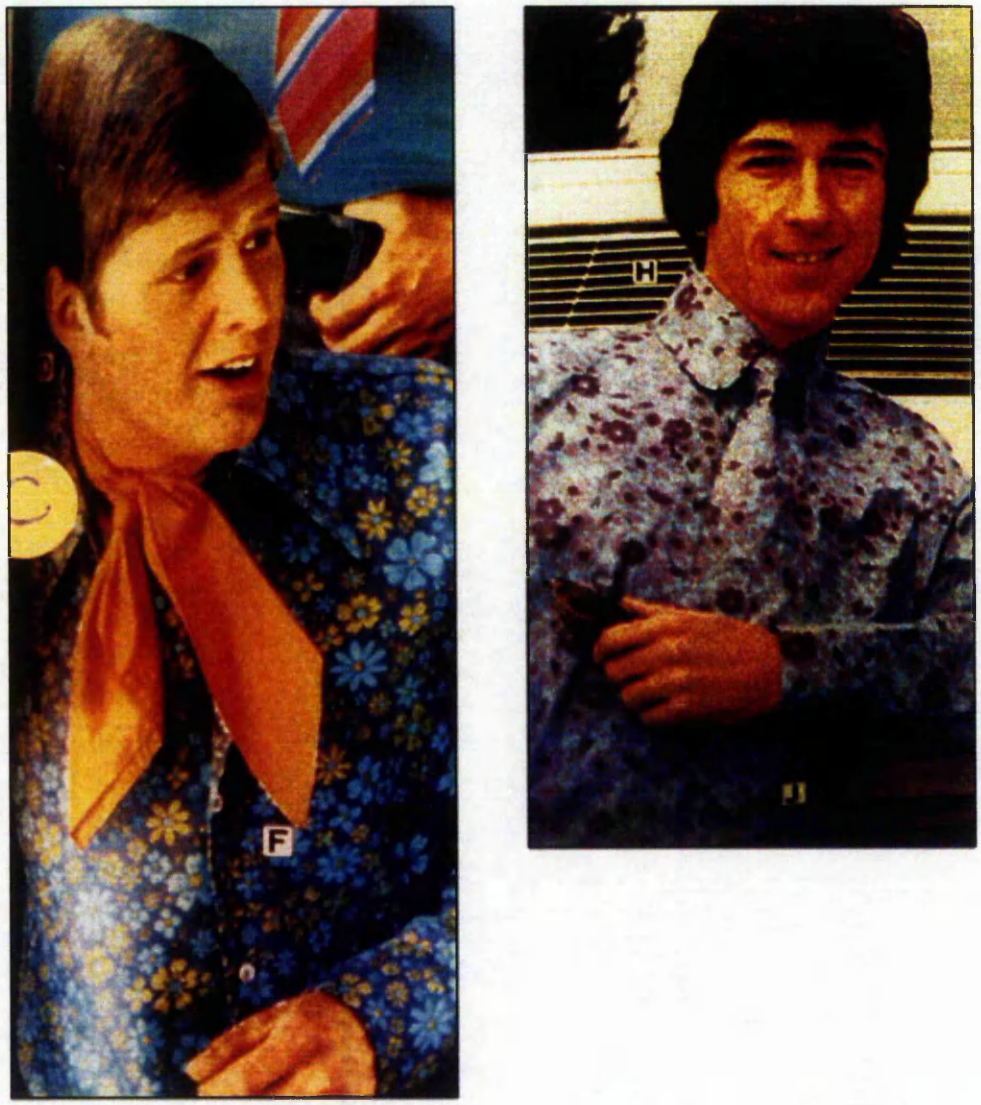

Figure 2-T: 1968/70 Floral Shirts from Freeman's 1968 (L) and 1970 (R) S/S Catalogues

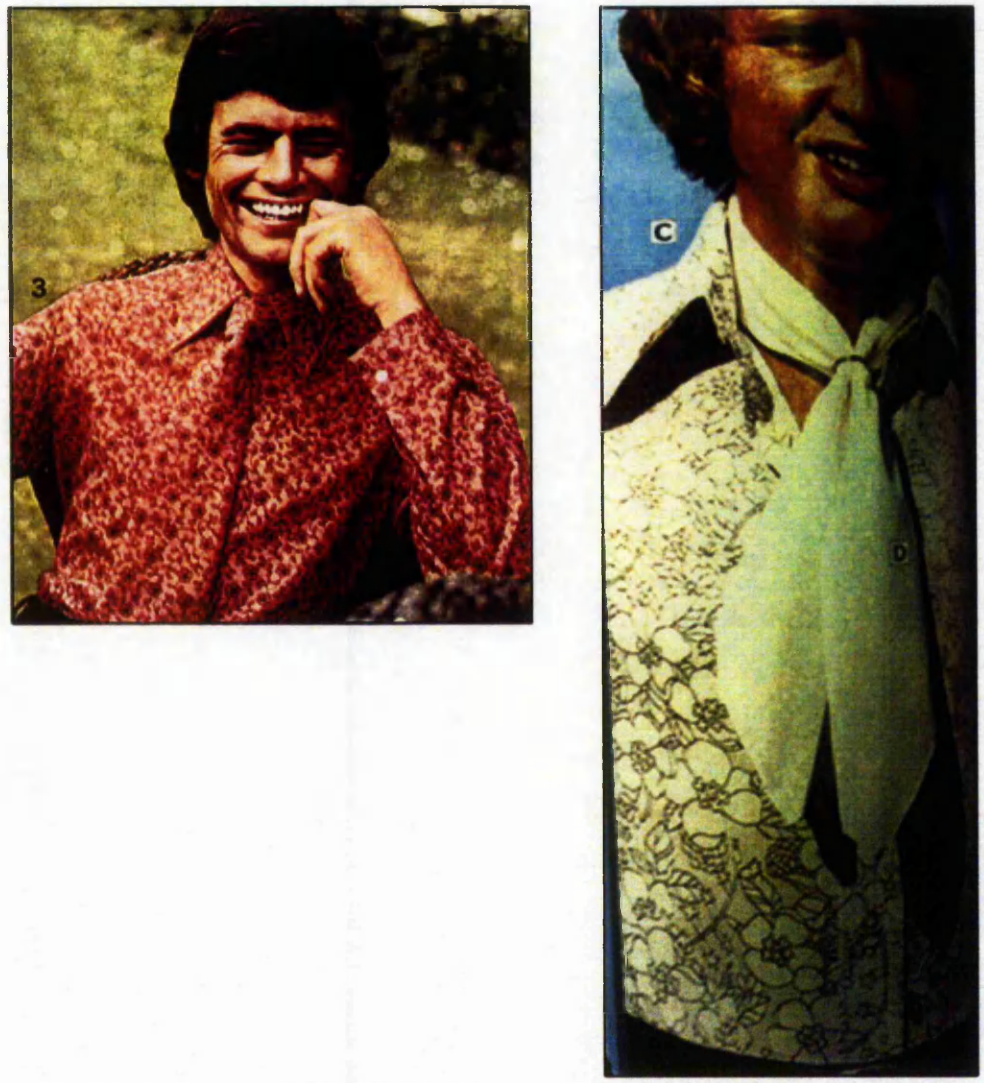

Figure 2-U: 1971/2 Floral Shirts from John Morgan in *Men's Wear* 1971 (L) and Freeman's 1972 (R)

2.6.4 Regularity

Order and chaos are polarities traditionally mapped onto masculine and feminine, as discussed in Chapter One. In pattern design, women's patterns are more likely to be irregular than men's. When motifs are placed in an orderly manner stripes, diagonals or a grid structure is often apparent. These designs are usually easily identifiable as the repeating unit can be traced and mapped – it usually taking the form of either a block or half-drop in these patterns[14]. In an irregular design the motifs are placed in such a way as to make the repeat unit difficult to identify. These patterns appear more chaotic and unstructured than a regular pattern. It is easy to see similarity between

[14] For an explanation of these terms refer to the article 'Need I Repeat Myself' in Appendix C

the geometric/organic polarity and the regular/irregular one; geometry, by its nature, leads to regularity, organics, to irregularity. However, contradictions can be found in the dresses in Figure 2-R, in which the geometric motifs are scattered irregularly, and Figure 2-X and Figure 2-Y in which floral motifs are placed in a very regular manner.

Figure 2-V and Figure 2-W show a selection of men's patterns that are regular, but would probably not fit into the categories of geometric or angular. The regularity in these patterns is tempered in several ways. In the left-hand pattern of Figure 2-V several intricate motifs are combined to give a pattern whose structure looks complex. All the other patterns use a half-drop repeat format to offset the regularity produced by a block repeat. In all cases except the right-hand side of Figure 2-V, the motifs are intricate and curvaceous, and of medium to large scale, adding femininity to the masculine regularity. On the left of Figure 2-V this is heightened through the use of a wide colour palette and in both the shirts in Figure 2-W it is heightened through the organic nature of the motifs. The pattern on the right-hand side of Figure 2-V is of smaller scale and less intricacy than the others, however the curvaceous design and half-drop still lessen the severity of its regularity.

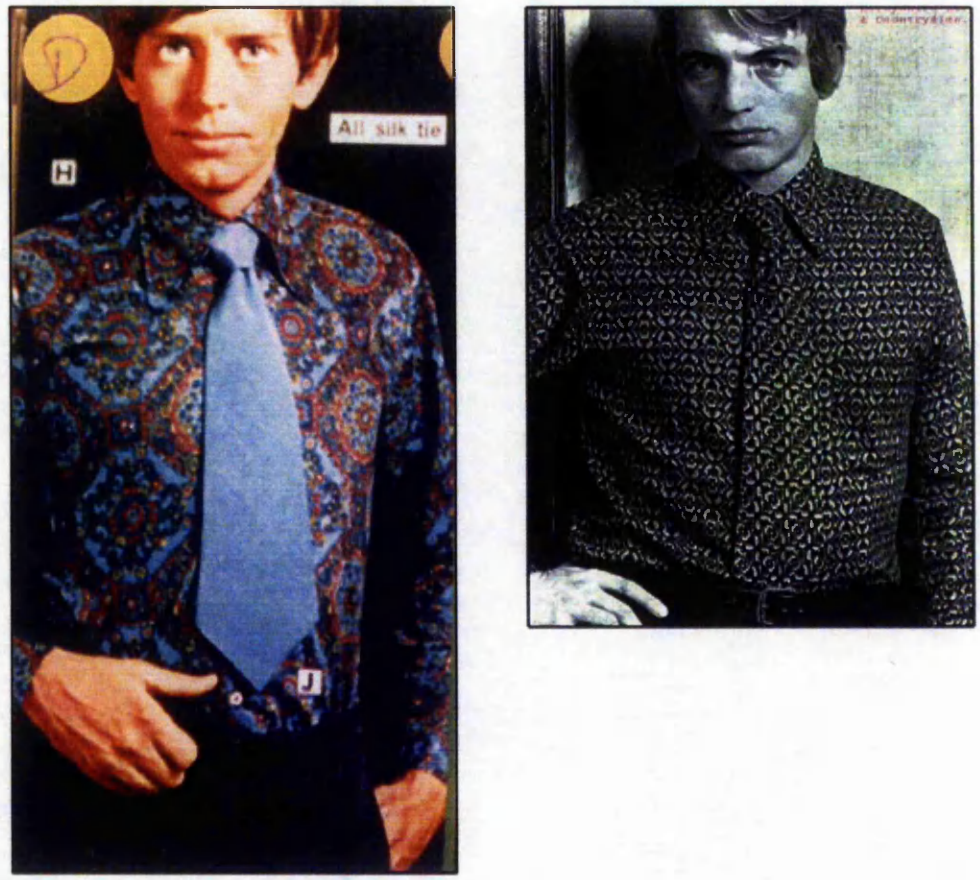

Figure 2-V: 1969/70 Regular Shirts from Freeman's 1969 (L) and Viyella 1970 (R)

Figure 2-W: 1972/3 Regular Shirts from Freeman's 1972 (L) and Kay's 1973 (R) S/S Catalogues

Figure 2-X to Figure 2-Z show six women's patterns that display regularity, all of which display floral imagery. The dresses on the right of Figure 2-Y and the left of Figure 2-Z visually appear more ordered. They both employ a single motif on a plain background. The regularity is tempered in both through the use of a half-drop repeat, which is further complicated by the reversal of the motif in alternate stripes on the latter of the two images. However, overall they probably appear more regular due to the larger motifs and greater space between them. One of the more complicated designs is shown to the right of Figure 2-X. The fairly regular spacing of similar floral motifs interspersed with a similar leaf motif gives the impression of simplicity. On closer inspection one can see the spacing between the motifs varies and it is hard to spot the repeat unit. This technique prevents stripes, diagonals or grid effects appearing on the pattern. The thin linear pattern style and limited colour shown in the dress to the right of Figure 2-Z is reminiscent of many of the men's patterns and has been demonstrated

to lessen the impact of the motif. In this case, it also lessens the impact of the regularity, as does the use of a quite intricate repeating motif.

Figure 2-X: 1969 Regular Dresses from Kay's S/S Catalogue

Figure 2-Y: 1970 Regular Dresses from Kay's S/S Catalogue

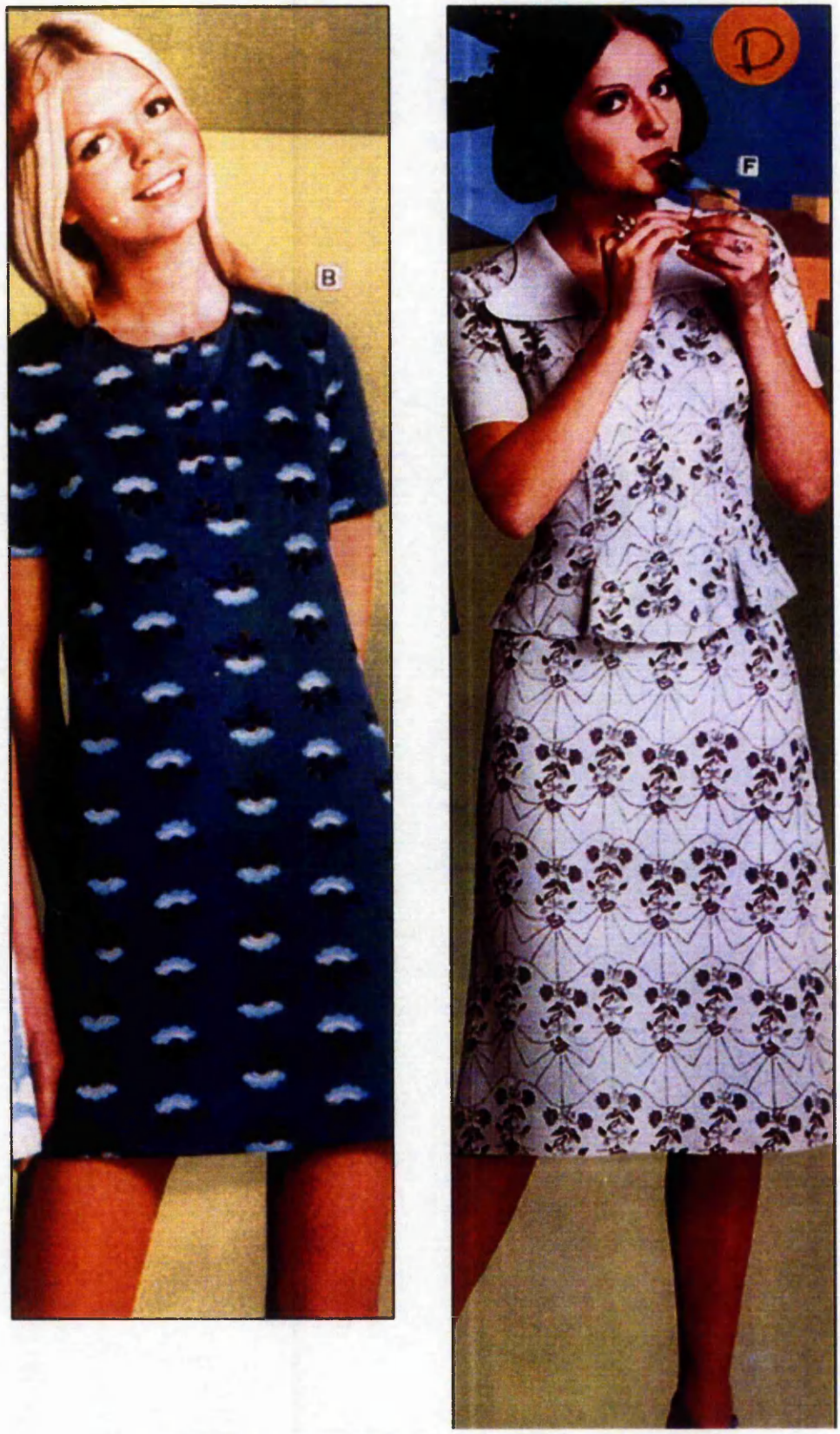

Figure 2-Z: 1971 Regular Dresses from Freeman's S/S catalogue

2.6.5 Unisex

From 1970 onwards examples appear in the catalogues of men and women wearing the same shirt, see Figure 2-AA to Figure 2-DD. Where this occurs in the clothing catalogues it was always in the men's rather than the women's section, and the shirt sizes are usually given by men's collar rather than, say chest, though they may be described as 'unisex'. The left image in Figure 2-AA shows a shirt already discussed in section 2.6.3. Clearly, it is at the more extreme end of acceptable pattern for men in terms of scale, offset by the use of a very structured geometric design. For women, the scale is quite normal for the period, though the geometry is more unusual.

The image to the right of Figure 2-AA is from the men's section in Vogue. It is unknown whether Vogue or Viyella did the styling, but this is quite obviously a deliberate play on gender stereotypes. As far as can be told, this pattern was only marketed only as a men's shirt, but is being worn by both the man and the woman. Though the shirt worn by the man is described as purple, there is clearly a reversal of the pink/blue stereotype. The woman is also wearing a large-faced man's watch and has her hair pulled quite severely away from her face. By contrast, the man's hair is relatively long and free, and his shirt is open, adding feminine connotations to the pink shirt.

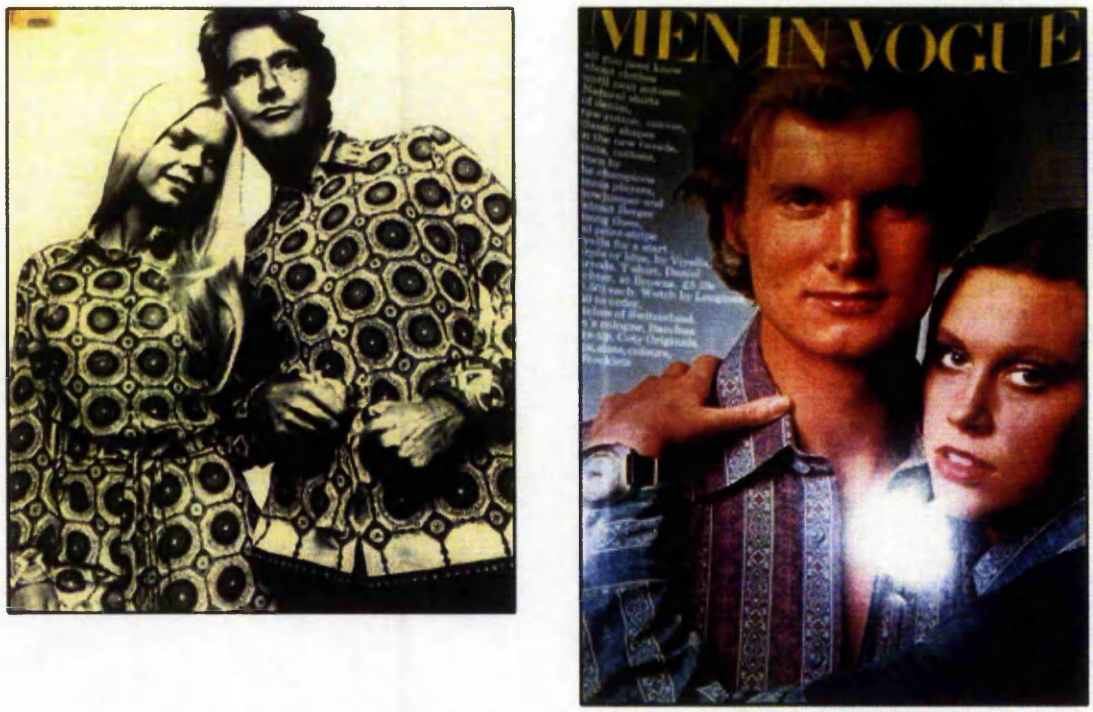

Figure 2-AA: 1970/1Unisex shirts from Viyella 1970 (L) and 1971 (R)

Figure 2-BB: 1972 Unisex shirts from Freeman's S/S Catalogue

In Figure 2-BB two shirts are shown being worn by both men and women, though interestingly the couple holding hands on the left are wearing their shirts in different colourways, hers being feminine associated in pink and purple, his in brown and cream. The inset shows a man separately wearing the pink shirt. The right-hand image is perhaps the more unusual as this shows a man and woman in the same geometric print. The print is angular and quite small scale, which is not offset by any of the more feminine features.

Perhaps one of the most interesting features of these images seen together is not directly associated with the garment pattern. In all cases, the women's head is significantly lower than the man's and in two of the images her head is tilted towards his. Even the *Men in Vogue* image in which the gender roles have been deliberately played with, and in which the female model is looking confidently at the viewer, she is clearly lower than the male, given less importance in the image, and is holding on to him in a way which suggests she needs protection.

Figure 2-CC: 1970 Unisex fabrics from Viyella

Figure 2-DD: 1972/3 Unisex fabrics from Viyella 1972 (L) 1973 (R)

Many instances were found in the Viyella archive in which the same pattern had been used for both men's and women's clothing. In some cases it is possible that this may have been a deliberate move towards unisex, as the top right image in Figure 2-AA suggests. However, in many other cases there is no promotional literature that places the items together and sometimes advertising images appear in different years. The reasons for use of the same pattern may have been more practical and economic than cultural. Once the screens or rollers had been produced, the pattern could be printed over and over again in different colourways.

In the images in Figure 2-CC and Figure 2-DD, the same print has been used in the same colourway. They are both quite large-scale prints that are curvaceous and irregular, giving them many feminine qualities. However the top pattern is an ogee style design with a feel of heraldry which may be masculine associated. It does not appear to contain any organic motifs. The bottom pattern is a large unstructured paisley motif. The obvious organic motifs are slightly offset by the masculine associations of the paisley and the dark colours, but overall this pattern contains many feminine elements. Interestingly, the men's garments are pyjamas and robes intended for wearing within the private (and feminine) sphere of the home.

While on one level these pictures indicate a move towards unisex clothes in the early 1970s that may have suggested more gender equality, the composition of the images in the first selection of garments suggests a more stereotypically hierarchical view of the sexes. Also, in all of the cases shown the patterns chosen move more towards the masculine than the feminine. In Chapter One the notion of truly unisex clothes was dismissed by Steele and other authors, but Steele goes further in her discussion of 1970s and 1980s unisex clothing by asserting that:

> '...if this was the new androgyny, it was both one-sided and ambivalent. Women might have been imitating men's clothes, but men were definitely not reciprocating.'(in Kidwell & Steele (eds.) 1989: 9).

While looking at the rest of the evidence in this chapter may lead to questioning the validity of this statement[15], it does have resonance in these particular images of unisex clothes, all of which are from the early 1970s, rather than the 1960s. It may indeed be another indication of the move towards more masculine signifiers that the 1970s brought.

2.7 Summary

This chapter has provided an account of the key social and gender issues associated with the case study period of 1967 to 1973, and the distinctive features of fashion and clothing, with particular reference to pattern, within the period. This account, together with the theoretical concepts from Chapter One has then been drawn on to provide a gendered analysis of pattern on clothing using archival data.

It has been shown that some correlation between the use of pattern on clothing and the social climate of the period is identifiable. While many of the cultural trends of the time appear at first glance to show a higher prioritisation of feminine associated values, a deeper investigation shows the issues to be more complex. At the start of the period of investigation, the use of feminine signifiers in pattern for both sexes was at its height, while the women's movement and the associated moves towards equality for women did not attain popularity until towards the end of the period when pattern on clothing was moving towards the masculine for both sexes. Sexual liberation was certainly an important issue at the start of the period, but in many ways, as the discussion showed, this seems to have been "hijacked" by the men of the period and used to their own ends. It is perhaps possible to view the appropriation of feminine associated patterns, and other feminine associations in appearance in the same light. In other words, it was an appropriation of, rather than an embracing of the feminine. As the women's movement grew in strength and fought against the objectification of women which had also proliferated with sexual liberation, it was somehow inevitable that they would see a need to forgo many of the feminine associated activities and objects. Being overtly interested in one's appearance and in fashion were two activities which seemed to need sacrificing in order to gain equality. These ideas can clearly be linked back to the associations of fashion and clothing with triviality and femininity discussed in Chapter One.

The important and concrete assertions that can be made from this study are those which show masculine and feminine signifiers in pattern on clothing in relation to the men and women who wore them. Throughout the period, difference remained. The indications of difference became much smaller and less easy to define, but were nonetheless still there. In most cases, though masculine dress acquired many feminine attributes, it retained some masculine ones to offset, balance, or maintain difference to

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[15] It should be noted that the two particular example Steele gives of unisex clothing, jeans with tee-shirts and 'dress-for-success' suits show her emphasis is on a slightly later period and on garment styles and shapes rather than pattern.

women's dress. Women's dress on the other hand, took the feminine signifiers to the extremes, and eschewed most masculine signifiers until the latter half of the period. In particular, patterns which displayed the femininely associated features of organic and curvaceous imagery were favoured by both sexes, while scale and regularity were features which were regularly used to provide difference, i.e. larger scale and less regular patterns were used more frequently on women's dresses, while smaller scale and more regular patterns were used more frequently on men's. A useful concept in the consideration of loosely 'measuring' feminine and masculine signifiers in pattern on clothes has been to consider masculinity and femininity as a continuum or sliding scale, rather than a binary opposition. In the period of the case study, when pattern for both sexes tended towards the feminine, it is also useful to consider the neutral point of the sliding scale to be moveable over time, rather than centrally fixed.

This work in this chapter has provided grounding for the examination of contemporary pattern on clothing which follows in the next. Despite necessary differences in the method of examination, which are discussed in the introduction to the chapter, it will be seen that many of the findings bear similarities which provide an opportunity to discuss contemporary views of masculinity and femininity.

Chapter 3

Contemporary Review

3.1 Overview

This chapter reviews the contemporary social and fashion climate, drawing on information gathered over the last five years, between 1997 when this research began, and 2002 when it was concluding. The research relies, to a large extent, on articles and comment from the British national broadsheet press, rather than academic studies as the emphasis is on capturing the essence of popular notions of the time. The previous two chapters have given a framework to allow a constructive analysis of changing gender roles and their relation to pattern on clothing.

Firstly, this chapter will examine contemporary debates on gender issues in education through the mass media. Regular stories of boys failing to do as well as their female counterparts will be examined, together with what may be perceived as a patriarchal bias in the reporting. In other words, are the issues reported more widely because it is *boys* who are doing badly?

Following this we will investigate the upsurge in popularity of science which has led to a stronger desire, and perhaps justification, for categorising behaviour by gender. Towards the millennium books such as *Fermat's Last Theorem* (Singh 1998) popularised mathematics, while Pinker's *How the mind works* (1998) popularised the concept of evolutionary psychology. This was furthered by a number of productions providing 'scientific research' into the biological differences in gender ability, such as the book and television series '*why men don't iron*' (Moir 1998) and books like '*Why men don't listen and women can't read maps*' (Pease & Pease 1999).

In the final decade of the previous century studies of gender, which had previously concentrated on women's issues and less widely, homosexuality began to acknowledge and sometimes defend the concept of masculinity. This 'crisis in masculinity' talked about by authors and broadcasters will be discussed as the role of men has changed significantly since the case study period and the concepts of 'breadwinner', 'head of the household' and 'job for life' which were previously associated with masculinity have been eroded.

Women, according to the media at least, have become more powerful and visible, while men are now struggling to find a role for themselves, but women in the UK are still paid less than their male counterparts, and the proportion of women in top-level employment is well below what might have been expected three decades after the equal pay act was introduced. How this has affected our views on the definition of femininity will be discussed, and it will be shown that these too have become

fragmented.

Since the case study period of the late sixties and early seventies, contemporary society has become increasingly postmodern. Previously well defined boundaries have become blurred. Chapter Two indicated that the regular bi-seasonal fashion change was beginning to break down by the early seventies. Contemporary fashion has become increasingly pluralistic; 'style' has a heightened importance to a wider audience across age, class and even gender than it did thirty years ago. Categories have also become blurred, making it difficult to separate designer wear from high street fashion from sportswear. Consequently, this chapter will not attempt to categorise and analyse clothing by the same method as Chapter Two, but will take a more eclectic approach to the data. A selection of images and articles from the mainstream and fashion press are examined using the gendered pattern set to give a framework for discussion points.

3.2 Contextualised Social Climate

There have been a multitude of wide-ranging and significant social and cultural changes in Britain since 1973, when the period of the case study ended. It is not the intention within this section to attempt to give an account of all of these changes and their effects. It was possible within Chapter Two to outline social events and beliefs which led to an assessment of the period in question being seen as feminine, even though on deeper analysis this can be seen as a superficial judgement. In a similar way, it may be appropriate to label the 1980s masculine by looking at the key values commonly associated with the era: patriotism, power, self over society, etc. In contemporary society it is common to hear the term 'feminised' as an expression or comment on our cultural and societal values.

This section will use a variety of recent articles, mainly from British broadsheet newspapers over the past four years to demonstrate some of the ongoing themes and issues concerning gender, particularly to investigate whether the current discussion of 'feminisation' is any less superficial than that of the case study period. Four, overlapping areas in which media comment is prevalent are education, popular science, masculinity and femininity.

3.2.1 Education

In 1998 the media carried many articles discussing research showing that girls were consistently outperforming boys at school, and this theme has continued to the present day. The *Telegraph Magazine* presented an article claiming 'the crisis of boys

underperforming is a national one' (Chesshyre 1998: 48). This article makes no reference to problems girls may face, and quotes Helen Wilkinson from the *Demos* think-tank as saying:

> Feminist writing tends to be unsympathetic. But if we don't recognise these insecurities, we are in danger of creating a backlash. We must reassure men that they have a place in this Brave New World. (Wilkinson in Chesshyre 1998: 48).

Lack of male role models in primary school, feminine orientated tasks, girls' greater desire to read and longer attention spans were blamed. It would appear that reading has become associated with the feminine, and hence has negative connotations to boys. One case study quoted in *The Independent* states that boys were 'cautious about admitting their pleasure in reading because of negative peer group pressure' (Abrams 1998: 5). While some were blaming a change in teaching methods, most reports gave credence to the theory of 'an anti-learning culture amongst boys...who tend to see schoolwork as "cissy"' (Lightfoot 1998: online)

The motivation for most of these articles is to report the crisis in male learning. However, buried in an article entitled 'Macho attitudes key to boys failing' with the by-line 'Review of a decade's research confirms that girls are outperforming boys at all levels of school' we discover that 'During the past decade the gap between the number of male and female entries [at A-level] in physics, technology and economics has actually widened.' (Judd 1998: 6) In other words, though girls are achieving more A-levels, they are reverting back to subjects considered traditionally feminine. This seemingly important issue takes up only one paragraph in this seventeen paragraph article, and was not widely reported elsewhere.

Writing in *The Independent Education Supplement*, Gunther Kress, of The Institute of Education, tells us that 'The future still belongs to boys' (Kress 1998: 4). He challenges the findings of a report by the Qualifications and Curriculum Authority which stated that boys were finding it 'harder to acquire the sedentary skills of reading and writing' (Kress 1998: 4) with the following statement:

> Boys, in their mastery of computers and computer games, have their hands on 21st century technologies while the girls are steaming ahead with 19th-century ones. Girls are in danger of being left behind again. (Kress 1998: 4)

It is gratifying to note that some areas of the press are paying attention to the problems girls face and we have moved away from the days when the eleven plus results were skewed in boys' favour in order to ensure equal numbers were recruited

to grammar schools. However, it is easy to imagine that the press coverage would not have been so great, or the call for something to be done so loud, if the genders had been reversed. The significant amount of press coverage given to poor results for boys in 1998 calls Burchill to question '...who lay down in stone that boys always had to do better than girls?' (Burchill 1998: 7). She summarises in characteristic manner:

> How to get men back on top, where they belong is the new buzz-phrase. No one can have missed the hysterical shifting of goalposts now mooted by educationalists: boys are doing badly at school because there are too few male teachers; boys are reading later than girls because they're not interested in poncey fiction, so they should be given books about practical things like football instead (when did the latin root of the word "educate" change from "lead out" to "pander to"?); and now the Labour MP Margaret Hodge has suggested that boys would do better if the teaching of reading was put off until about three years later for both sexes.' (Burchill 1998: 7)

3.2.2 Popular Science

At around the same time as the start of the flurry of research and articles on gender performance in schools came a number of articles, books and television documentaries claiming biological sex differences, many attributing difference either to evolution or brain differences, or a combination of the two. For example, in 1998 an article with the headline 'Desire: it starts in your genes, not in your jeans' (Andreae 1998: 5) appeared in the *Independent on Sunday* with the by-line 'Human sexuality is complex and confusing, but evolution usually leads the way' (Andreae 1998: 5). Another article from the science editor of *The Daily Telegraph* told us that:

> Men and women are both evolving to look younger and more feminine...The human race will become more baby-faced because men with feminine facial features are perceived as kinder and more likely to be good fathers, while men with more masculine faces are seen as cold and dishonest. (Highfield 1998: online)

Evolutionary psychology became 'the new black of science fashion' (Hill 1999: online) One of the first television documentaries to popularise this 'combination of cognitive psychology and the evolutionary biology pioneered by Charles Darwin' (Hill 1999: online) was *Why Men Don't Iron* (Meyer 1998: TV) in which research into brain patterns suggested that men and women are 'hard-wired' to think differently. Though the documentary maker claimed 'nothing in this research implies that one sex is inferior or superior; and no-one in the field is implying that biological factors are the only factors' (Meyer in Lacey 1998: 1), the generalisations made tended to give weight to the stereotypical view of masculine and feminine as polar opposites. As Lacey points out in her review, the documentary is '...setting out to prove that there is such a

fundamental difference between the way that male and female brains work that it cannot be any other way.'(Lacey 1998: 1). The documentary implied that men's success at the top end of the workplace was due to their higher competitiveness, but as Greenfield points out in the Education Section of *The Independent* 'we might be in danger of thinking that it is "unnatural" for girls not so much to be competitive, as to be successful in any case' (Greenfield 1998: 2).

As the popularity of evolutionary psychology rose, journalists and others started to question both its validity and its practical use. Hill stated: '...I can't see that it tells us much about gender relations in the modern age, even if the science is flawless.' (Hill 1999: online). While this may well be true, it hasn't stopped the popularity of television programmes and books such as the ones mentioned above or the self-help manual *Men are from Mars, Women are from Venus* (Gray, 1992). This has now been joined by a sister work entitled *Mars and Venus in the Workplace* (Gray, 2001), which includes sections such as 'men go to their caves and women talk'. While science may no longer be viewed as absolute truth, especially by scientists; it would appear that evolutionary psychology fulfils a popular desire for explanations and answers to life and its uncertainties.

In 2000 it was announced that the first draft of the human genome had been completed (McKie 2001a: online). Biologists involved in genetic research have in some cases claimed to be able to determine behaviour patterns such as sexual preference and criminality through individual genes (McKie 2001a: online). It seems that this reawakening of interest and belief in science which genetic research has encouraged in the media has fuelled wider reporting of difference in other areas such as gender, race and sexuality. Certainly, it seemed as though categorising and classifying humans was being given a new level of importance and significance.

Since the initial publication of the genome it has become clear that a human contains far fewer genes than first thought, and some scientists are now saying that reliance on biological determinism is unreasonable. According to *The Observer* a scientist working on the gene-sequencing project for the company *Celera* has been quoted as saying 'We simply do not have enough genes for this idea of biological determinism to be right' (Venter in McKie 2001a: online). While scientists may be questioning the reliance on this idea of hard-wiring, it would appear that the idea of it has captured the media, if not the public's imagination. There is a continuing steady flow of articles in the press commenting on research which is said to show how one gene or another is responsible

for some or other human trait[1].

However, the popularity of science and the research into discovering 'scientific answers' for the human condition has not gone without critical comment in some areas of the press. Hill writes in *The Guardian* 'Has anyone announced yet that science is the new sex?' and tells us how bookshops are full of 'tales of evolutionary forces driving mysterious "mating strategies"' (Hill 2000: online). He makes his points about the plethora of scientific research on gender differences in relation to a Channel Four documentary entitled 'The Difference' which looks for scientific differences in race. It would appear this is another area in which the media are seeking to find and use scientific research to give explanations of difference.

It is difficult to attribute this phenomenon solely to the mass media, as Walter, writing in *The Independent,* questions the emphasis on evolutionary psychology by discussing the profusion of research attempting to find gender differences documented in one issue of *New Scientist* in the summer of 2001 (Walter 2001: online). She questions the validity of much of the research as it bases itself on traditional beliefs, which she describes as:

> ...the most banally conservative mindset: that women want good men who stick around, while men want to sow their seed and run; that women are cave dwellers and nurturers, while men are hunters and fighters. (Walter 2001: online)

Finally, she addresses the puzzle of why this phenomenon has become popular now, after the comparative freedom of the 1970s and 1980s:

> It's odd, isn't it, that just as women are escaping from the most restrictive patterns of femininity and just as men are beginning to feel fine about admitting to behaviour that their fathers might have found curious, this cultural backlash is trying to squeeze men and women back into little boxes marked "sugar" and "puppy-dogs' tails" all over again. (Walter 2001: online)

While renewed interest in science and its potential may be partly attributed to new discoveries in genetics, it would seem that there is a wider contemporary desire to attempt to categorise, resolve, and determine sex differences than there has been for some years. Perhaps this may be attributable to our wider acceptance of ambiguity and fluidity in gender roles. If, as the structuralists discussed in Chapter One tell us, our brains work through categorisation, accepting varying and uncertain gender roles

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[1] In one of the most recent examples, *The Guardian* documents research which suggests that a gene has been identified which is responsible for early morning and late night alertness. (Hughie, 2002)

and styles could invoke a desire for certainties which these scientific responses provide.

We must also remember, while considering this matter that biological sex and gender are not the same: '...biological material determines sex, making us male and female, but does not determine traits of 'masculinity' and 'femininity' which are products of culture.' (Entwistle 2000: 143). It is possibly the current fluidity in gender definitions which creates a desire to link difference back to something biological, (and hence concrete), rather than cultural (and hence changeable).

3.2.3 Masculinity

Masculinity, or more precisely masculinities, became an important keyword of the late 1990s. Masculinities is a term which has been adopted to acknowledge and emphasise the concept that masculinity is not one fixed concept, but a series of fluid and diverse concepts of postmodern manhood.

Many theorists identify the 1980s concept of 'new man', described by Beynon as 'the stereotypical image of the anti-sexist, caring sharing man' (2002: 115), as being the catalyst of much writing on masculinity, both academically and in the media (Entwistle 2000: 174). Both Entwistle (2000: 174) and Beynon (2002: 98) cite the works of authors Sean Nixon, Tim Edwards and Frank Mort as being crucial to showing how masculinity became associated with economic and commercial forces at this time. Beynon summarises their work by describing the new man as having two strands: nurturer and narcissist (Beynon 2002: 98-121), while Entwistle acknowledges that 'these developments in retailing and marketing extended the regime of representations of masculinity...' (Entwistle 2000: 175).

A rough indication of how widespread the discussion of masculinity and masculinities has become can be seen through the pages of the Amazon online bookstore. A recent search using the keyword 'masculinities' in the book section resulted in 92 titles. Of those only four were published before 1990 and seventy percent were published after 1996. Less startling results are given through the search on 'masculinity' which revealed 445 results in the following proportions: 46% since the start of 1997; 36% between 1990 and 1997; 17% before 1990. However, given that a similar search for 'femininity' gave 186 results, evenly split over the three time periods, the results do appear to be significant in showing a rising interest in masculinity (Amazon 2002: online). Figure 3-A shows these results graphically.

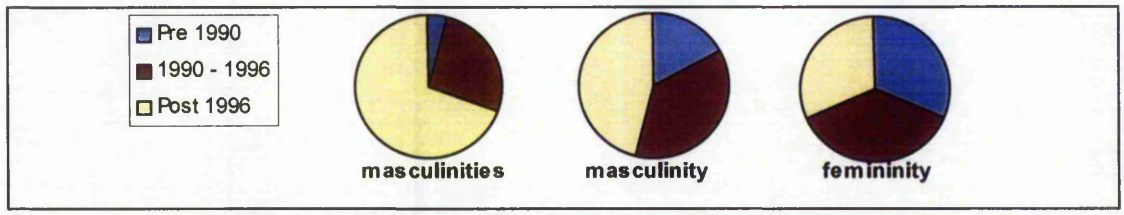

Figure 3-A: Pie charts showing titles containing keywords over time

Connell (1995), in the preface to his book *Masculinities* states that masculinity became a popular subject for discussion in the early 1990s, particularly in America. He describes his consternation that 'the burst of publicity has brought back obsolete ideas about natural difference and true masculinity.' (Connell 1995: ix) Rather than identifying consumption as a catalyst, Connell's ideas can be linked to the above discussion on the use of science to justify difference and, as he says 'It has also provided cover for a neo-conservative campaign to roll back the rather limited advances against discrimination made by women and gay men in the last two decades.' (Connell 1995: ix).

Many new terms have been adopted to describe different types of masculinities since the 'new man'. Beynon (2002: 119) sees fit to comment on the 'media's fascination with categorising and labelling of contemporary masculinity'. Certainly, and referring back once more to the previous discussion on the current fascination with science, it would seem that regardless of the identification of blurred and fluid boundaries, 'pigeon-holing' is still a popular concept.

The most widely used contemporary label for a particular strand of masculinity that emerged in the 1990s is 'new lad' which has become so widely used that 'new laddism' and 'laddist' are words frequently used in the popular press. 'New laddism' can be seen as a reaction to 'the 1980s men's style press and ...growing assertiveness of women' (Beynon 2002: 111). The magazine *Loaded* which originated in the 1990s is now seen as the embodiment of 'new lad' culture.

> Laddism was a celebration of the irresponsible, of unreconstructed young-men-running-wild reduced to their crude basics and promoted in *Loaded* through jockstrap humour and 'bikini-style' photography. (Beynon 2002: 113)

In 1999 the press reported research by Oxford University (sponsored by Top Man clothing chain) which showed that 'Confused and scared teenagers are adopting New Laddism as a way out of emotional crisis' (Arlidge 1999: online). The report suggests that 'the proportion of alienated boys is growing all the time.' (Arlidge 1999: online) and that 'Alienation is already so deep and widespread that a worrying backlash

against girls is emerging.' (Arlidge 1999: online). In the group of teenage boys described as 'problem' almost half were reported as saying that 'the struggle for sex equality has gone too far.' (Arlidge 1999: online). This report and others like it point towards the 'crisis in masculinity' which is often referred to in the media.

As masculinity becomes harder to define and more fragmented, it is perhaps not surprising that there is both a nostalgic desire to revert to past times when the gender roles were 'more separate' and a desire to discuss the problems and possibilities of new versions of masculinity:

> Today's male carries around in his head notions of manhood which, while forged over a number of centuries, flowered in the nineteenth century, a century of unparalleled male achievement in science, technology, biology, medicine, exploration and imperial expansion. (Clare 2000: 69)

As psychiatrist Anthony Clare points out, this stereotypical version of manliness can be largely attributed to nineteenth century values which seem difficult to shake off, even in the twenty first century when many of the 'achievements' listed have been called in to question, discredited, or surpassed. He goes on to warn that:

> According to some prophets of the human condition, if men do not engage in serious revaluation and reconstruction, they will become utterly irrelevant as social beings. (Clare 2000: 100)

Surely, all this academic and media interest is attempting to revaluate and reconstruct masculinity? Beynon suggests that while the 1980s and 1990s were a time for questioning masculinity, the press commentary in the new millennium has simply turned it into a problem with no solution or optimism. He states 'If masculinity is not in crisis, then it is not for lack of trying by the broadsheet journalists!' (2002: 143). This sentiment can be clearly seen in the following quote describing what *Observer* journalist Barbara Ellen sees as the next version of masculinity after 'new man' and 'new lad', the 'New Baby Boy':

> He is a bit like New Man (he means well) and New Lad (a guy's got to have a pint), but with a creepy new infantile twist. Every time New Baby Boy is given a ribbing from the girls, he'll run off, blubbing, and telling tales to the media. Astonishing, really. When women felt they were being oppressed and denigrated, they fought back. Now that men feel the same way, they wail to the press about how badly they are being treated and how confused they are. (Ellen 2001: online)

3.2.4 Femininity

Though femininity is not discussed or questioned as directly as masculinity in

contemporary society, it can certainly be seen as being equally in flux. The value of the stereotypical attributes assigned to femininity is one which women themselves appear to question, sometimes defending and sometimes denouncing. It would appear on the surface that femininity is also in crisis, although women are not. Their roles and futures seem certain and optimistic, while the role of the Western male is still in question.

Though women now play an active part in the workplace and social arena, the attributes associated with these tasks have not become associated with femininity. Indeed it appears that women are still given reminders by the press that work is not a place for women. In 1998 *The Independent* contained an article highlighting how scientific research was being distorted by the press to produce 'scare-mongering' stories, in this case against career women being more likely to have premature babies (Forna 1998: 5). Though the scientific findings were said to show that it was generally factory workers to whom this applied, the tabloid press allegedly used pictures of business women with the story in an implication that having a career was to blame. Forna, reflecting the views above concerning the contemporary views on science blames 'the reporting of science, twinned with the popular belief of science as absolute' (Forna 1998: 5) for the media's ability to create scares. She also addresses the targeting of women who work, commenting that similar scientific studies which may show men potentially endangering their children are not given the same space or severity in the press. 'Men' she says 'are neither blamed for their lifestyles nor held responsible for their children's health' (Forna 1998: 5). More recently, Jenny McCartney, writing in *The Daily Telegraph* echoed this view in her article criticising the *Daily Mail* reportage of a breast cancer scare:

> It purported to "reveal" that women who "delay having children" run a much higher risk of breast cancer. The unspoken message was: see what these so-called liberated women end up with for muddling around in the office, and not in Mothercare. (McCartney 2002: online)

More positive reports on women having careers also began appearing in the press, perhaps contributing to the 'crisis in masculinity' described above. In 1999 one headline ran 'Official: women are top bosses' the by-line reading 'female managers really are better at their jobs, as the biggest ever study shows' (Ridley & McLaughlin 1999: 3) Interestingly, this report seems rather biased in favour of women. It is the third paragraph before it is revealed that the study is from the USA. While it may still be relevant for a British newspaper to comment on, there are many differences in American and British working practices and gender relationships. This bias is compounded by using photographs and comments by a selection of British women in

high-powered careers. The article does go on to talk about the continuing problems for women in the UK achieving high positions in British companies.

A more light hearted article in *The Sunday Times Style* section entitled 'Women on top' communicated similar ideas to those in the previous article by using a series of management consultants' opinions about the benefits of women employees with 'soft' management skills, and the need to train men to be more like them (Kirwan-Taylor 2001: 8). Comments such as 'men, poor dears, are hampered by their biology' (Kirwan-Taylor 2001: 8), show how the scientific argument can be used against men, while images such as Figure 3-B used in the article can be seen as mocking contemporary masculinity. The depiction of an action man doll represents a machismo style of masculinity, while wearing an apron has the usual connotations of the domestic, household chores and femininity. This is heightened by the lip motifs in shades of pink; the colour and connotation of lipstick representing an overt form of femininity.

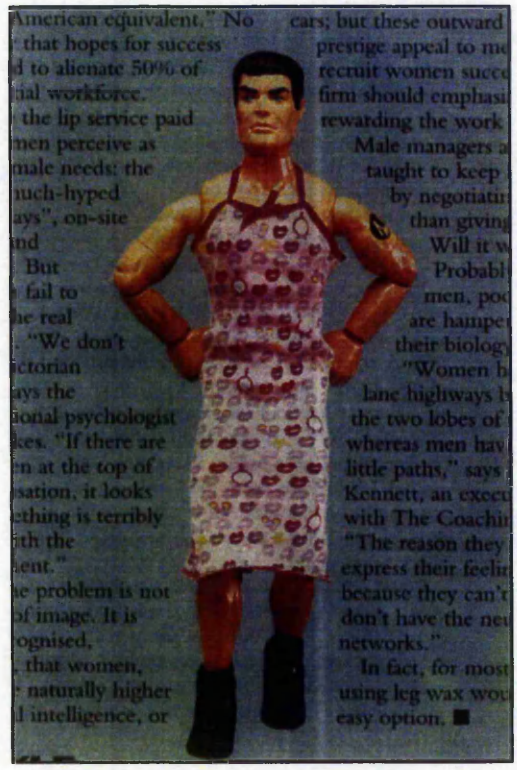

Figure 3-B: Action Man in Apron, *Sunday Times Style Magazine* (Kirwan-Taylor 2001: 8)

This mocking and deriding of men and traditional forms of masculinity by women is lambasted by other female commentators who acknowledge that it is unhelpful in the attainment of social equality. To prioritise women and the feminine is simply to overturn the polarity, not to subvert or democratise it.

As 'laddist' behaviour became popular with some men in the 1990s, so the female

equivalent of 'ladette' was born. Pizzey describes them as women who:

> ...reached out for male power and dressed and behaved as obnoxiously as the men of whom they complained, while insisting that men should cave in to their demands to be more like women. (Pizzey 2001: online)

She also identifies them as women for whom 'the very idea of femininity was anathema' (Pizzey 2001: online) and talks of the difficulty of reintroducing 'feminine virtues of gentleness and patience' in the 'present-day culture of women behaving outrageously' (Pizzey 2001: online). While media and academic discussion of masculinity does seem to allow for new versions of masculinity to be forged, femininity seems not to be re-definable. One of the problems seems to be that it is uncertain whether women who succeed in non-traditionally feminine roles are acting in a masculine way, or simply a different feminine way which was previously unavailable to them.

Following the 2001 Olympics, Mott discussed the under-representation of women in sport and asked 'Is male sport inherently superior to women's because of the competitive, horn-locking, egotistical, testosterone-fuelled nature of man?' (Mott 2001: online). She identifies many areas where women can and do succeed in sport and sees suppression as the reason why women's sport is not given equivalent media coverage:

> At the moment, the message driven home during a [girl] child's formative years is that sport is what Roy Keane does, exercise is dancing, playing to win is distasteful and the most popular female role model is Rachel out of S Club 7. (Mott 2001: online)

While most female role-models still appear to come from show business rather than politics, sport, education or other cultural activities, it is easy to see why the 'ladette' syndrome and behaving badly are appealing to young women. This behaviour is also synonymous with the prevalent culture of our time in which attributes that are generally acknowledged as virtuous such as kindness, honesty, fidelity and trust are eschewed in favour of their opposites. This can be readily seen in contemporary television advertising, particularly for alcoholic drinks which appeal to the younger market, such as *Smirnoff Ice*, with the advertising slogan 'as clear as your conscience' and *WKD* with 'Have you got a WKD [wicked] side?'. Consequently, it is difficult to disengage the reasoning for a culturally perceived shift away from virtue and the concurrent shift away from the traditionally feminine attributes, many of which could be considered virtuous.

Advertising is just one area of popular culture in which it is readily apparent that

gender distinctions, roles and stereotypes, while often twisted or inverted, are still very much in evidence. Clothing is another. Gender blurring and androgyny has been a popular theme in fashion design over the last few years and representations of masculinity have been questioned. In the next section this will be discussed with particular reference to pattern on clothing, relating back to the case study findings from Chapter Two.

3.3 Contemporary Pattern on Clothing

My MA research in 1995 indicated that pattern on clothing had lost popularity among the younger market (Carlisle 1995). By 1997, at the start of this research, it appeared as though pattern on clothes was to be relegated to the older generations and those individualists who remove themselves from mainstream fashion[2]. Indeed one of the initial motivating factors for the design work was to produce patterns that transcended the stereotypical views and associations that were made, particularly of larger floral prints.

In 1998 *Marie Claire* reported that a 'full-scale revolution against early 1990s minimalism' (Watson, 2002, p170) was occurring:

> This is the big one, a seismic shift in fashion...The new look is not about a trouser-suit revival or the 'new high heel', but about clothes with a completely different feel to them: pretty, decorative, colourful clothes... (Watson 1998: 170)

While fashion journalism has a tendency towards over-statement, it would appear this prediction was right. This particular article still made little mention of patterned garments, concentrating on decoration through accessories and trimmings, but by 1999, more pattern was appearing in the fashion magazines. Sixties and seventies 'retro' looks have been a contributory factor in bringing pattern back into the high street for both sexes. By April of 2001, *The Independent on Sunday Magazine* declared 'a rare moment of fashion extremes has arrived...with bright, bright prints in an extravaganza of summer abandon. Enjoy it while it lasts – black will be back in no time.' (Duncan 2001: 28). Melanie Rickey (2001: 38), writing in Nova, described the new popularity of pattern as 'fashion's new take on wearing designer logos.' Her premise for the article being that patterns which are easily identifiable as belonging to a particular designer provide a new method of branding to replace the waning consumer desire for logos.

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[2] With the exception of holiday wear, which perennially includes printed patterns.

Since the case study period of 1967 – 1973, fashion, or style has become accessible and desirable to a much wider audience. This is particularly true for men, as a consequence of the 1980s assimilation of them into consumer culture, described above, and the youth market which has followed suit in the intervening period. Similarly, as the contextualised social climate, described in the sections above, has shown, there is an increased ambivalence in contemporary gender roles. Consequently, while the gendered pattern feature set still provide the emphasis for discussion, the break down and analysis in this chapter reflects the blurred boundaries of contemporary postmodern culture.

This section will discuss contemporary fashion, predominantly through use of fashion spreads in the broadsheet and mainstream fashion press. While some of the fashions shown might be described as 'designer' rather than 'high street', these garments are usually selected by the mainstream press as indicators of trends which are likely to move to the high street, rather than the more elaborate and extreme collections often shown on the catwalk. Information from the plethora of style/youth magazines now available has not been discussed. It was felt that the very particular styling of the fashion pages in these publications which can be seen as polysemic or 'undecidable' in meaning would cause undue confusion in its analysis. These magazines, while widely read, do also represent a smaller minority of the clothes-wearing public than this study intends to include.

The following discussion separates patterned garments into organic and geometric sections. While this sectioning provides direct links to the gendered pattern feature set identified in Chapter One, the other elements of scale, regularity and angularity are considered within both sections. Firstly, colour and its contemporary use on clothing is discussed.

3.3.1 Colour

Before addressing the main issues of floral and geometric designs a small comment on colour would be useful. Colour, as was shown in Chapter Two, is probably the most significant gender signifier in pattern on clothing. Darker colours, more limited ranges of colour and tonal designs are all associated with masculinity. Pastel shades, bright colours and large numbers of different colours have all been femininely associated in the twentieth century.

The 1990s saw a migration towards black clothes for women, which provided a 'safe' option in business environments where overt expressions of gender may be considered

unwelcome. Harvey links the colour black with power and asserts that its disassociation from masculinity: 'goes with the fact that men are no longer conceded the predominance that, in earlier times, they took for granted as their birthright' (Harvey 1997: 225).

A contemporary analysis of fashion shows that bright colours have recently become important for both women and men's wear. Harvey (1997: 254) considers that contemporary society has moved from a work ethic to a work-and-play ethic in which clothing is polarised between the two activities, and colour is seen as appropriate for play. He states that, for men:

> The play ethic entails colours, but they are play colours, as in football shirts, track suits, ski-wear: play more than display, signifying hygiene, physical vigour, and also the contained discharge of aggression, rather than play of feeling, emotional variety. (Harvey 1997: 254)

His view then is that colour in men's clothing does not represent feminisation, but rather a different form of masculinity associated with play and sport, rather than work.

While bright colours in general may be associated with femininity, the colour pink has particular 'non-masculine' associations which have led it to be associated with homosexuality since pink shirts were first worn by gay men in the 1950s (Cole 2000: 62). It is interesting to see that the style of media commentary on the invasion of a feminine colour such as pink into a masculine domain is very similar to that of thirty years ago. In the *Sunday Times Style Magazine* a recent fashion headline read 'Can real men wear pink?' (CC 2001: 9). The article advises that '[pink clothes] aren't simply reserved for the likes of Elton John to spend his pink pound on.' (CC 2001: 9). It continues 'It seems modern men ... couldn't give a fag, sorry, fig for the traditional rules stating which colours are considered acceptable in a gentleman's wardrobe.' (CC 2001: 9). This type of commentary clearly shows how, regardless of the actuality of which gender is wearing pink, the stereotype remains. The deliberate word play used in the quote suggests that the author, at least, clearly *is* bothered about the 'traditional rules'. Pink remains an overt representation of femininity, which, if worn by a man, still appears to suggest effeminacy or homosexuality.

3.3.2 Florals

In autumn 2000, *the Independent on Sunday Magazine* (see Figure 3-C) reported that the fabrics 'may have a more feminine look than the brazen prints of summer – but don't be fooled into thinking they're fey' (Lambillon 2000: 23). The implication seems to be that though the prints shown may be described as feminine in nature, one

shouldn't be put off them for that reason. The word 'brazen' is used in opposition to 'feminine', suggesting that femininity should not be associated with brashness, or even perhaps that femininity is concerned with not drawing attention to oneself.

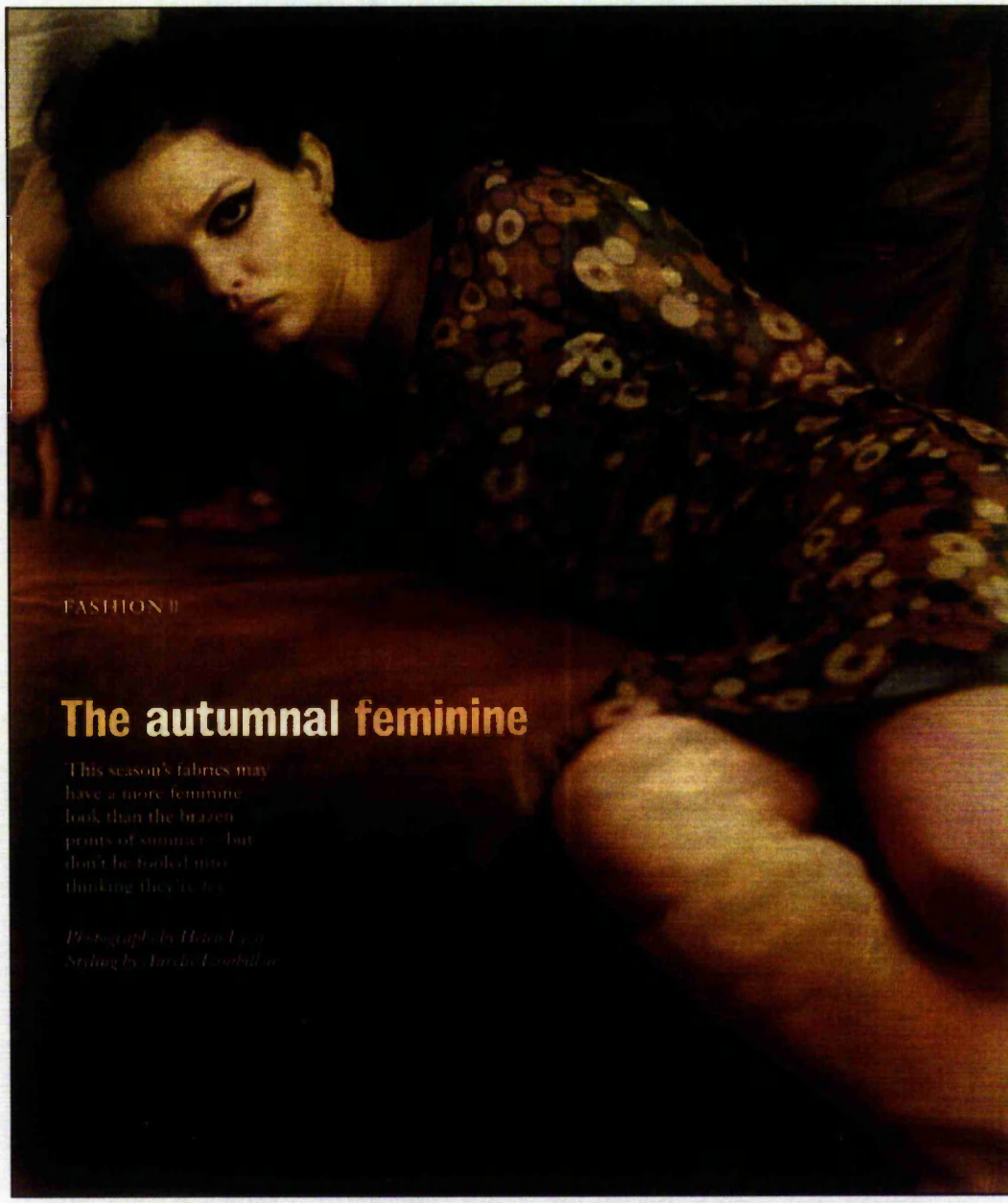

Figure 3-C: 'The autumnal feminine', *Independent on Sunday*, (Lambillon 2000: 23)

Figure 3-D. 'flower power' *Telegraph Magazine* (Cordle 2001: 21)

In *The Telegraph Magazine* spread (Figure 3-D) the commentary reads 'There's nothing girly about these prints. The bold florals in strong colours that came down the catwalk this season are already invading the stores.' (Cordle 2001: 21). In this case the suggestions are twofold: firstly that prints which are large and bold are not 'girly' or 'feminine', and secondly that to look feminine or 'girly' is not a particularly good thing.

This also echoes the previous sentiment in that 'bold' and 'strong' can be associated with 'brazen' and are set in opposition against feminine.

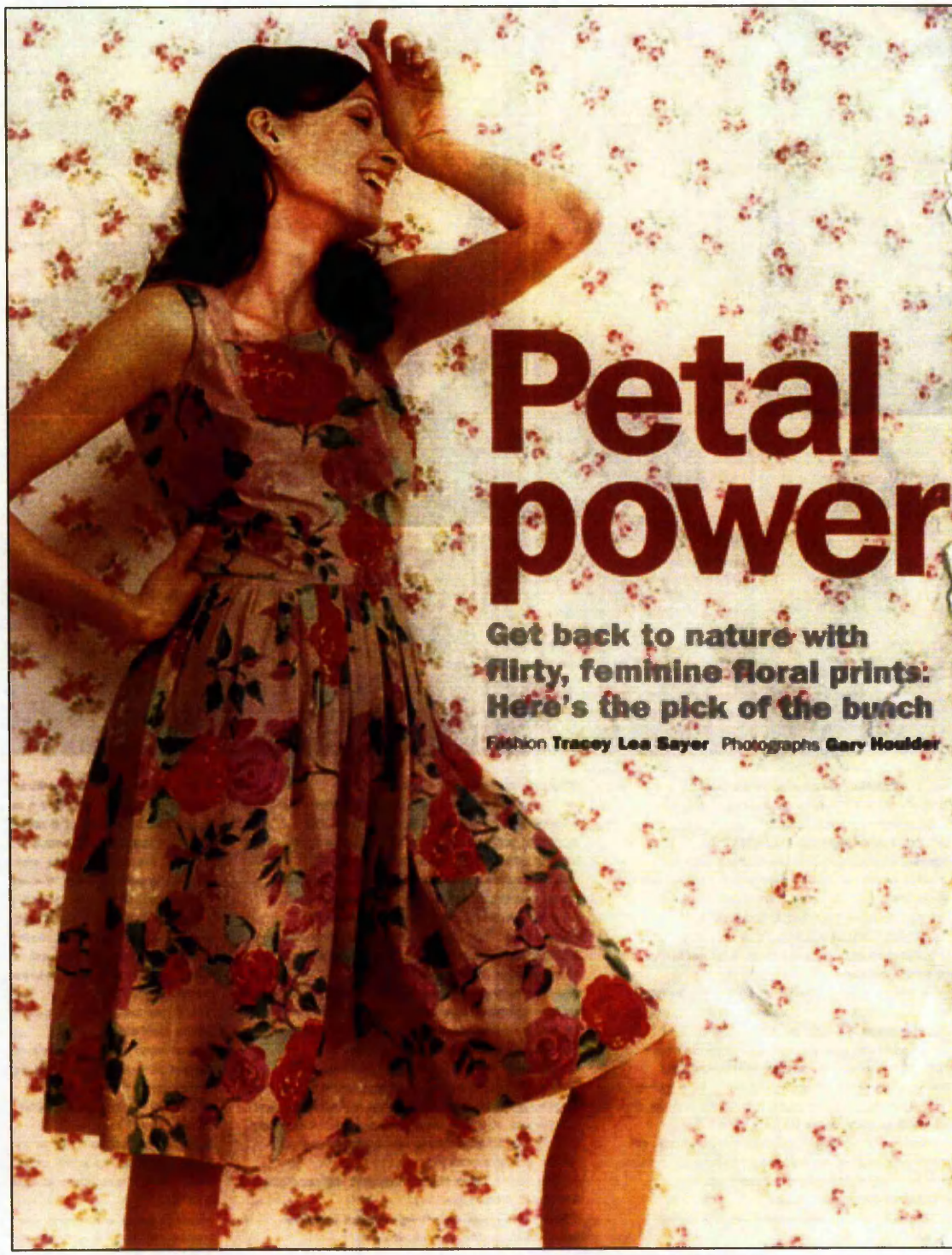

Figure 3-E: 'Petal Power', *Sunday Express*, (Sayer 2001: 22)

However, this isn't true in all cases, Figure 3-E shows spread from *The Sunday Express Magazine* featuring very similar patterns to those in *The Telegraph Magazine* (Figure 3-D). Here they are described as 'flirty, feminine floral prints' (Sayer 2001: 22). They

are being promoted without excusing the use of the word feminine. In this spread, as in the previous one, the floral patterns tend to be shades of pink. While the prints are large and unstructured, they are set against a background of pink rosebud wallpaper which heightens rather than diminishes the traditional feminine connotations.

Figure 3-F: 'Passion Flower', *Sunday Times Style Magazine*, (Durrant 2002: 19)

Figure 3-F shows another, similar representation of the floral by associating it with sexiness. The comment 'Floral prints have undergone a sexual revolution this season' (Durrant 2002: 19) along with the provocative stance and poses assumed by the

models can be interpreted as meaning that this season's floral patterns can be viewed as sexually attractive, even sexually demanding, and also perhaps that this hasn't been the case before. This may suggest that new version of femininity may encompass sexual assertiveness, rather than being in opposition to it.

Figure 3-G shows a very large scale floral kaftan by Dries Van Noten. There are very clear similarities between both the style and pattern of this garment to some of those described in Chapter Two. The accompanying text links the kaftans with a 1970s revival and describes them as having 'a pretty, almost childish innocence about them, often offset by bold prints...' (Irvine 2002: 37). This description tacitly sets femininity (as represented by the word pretty, and perhaps the word childish too) in opposition to bold prints.

Whether femininity is seen as desirable may be down to readership, or individual journalistic style, but in all cases flowers are still displayed as being feminine. Of course, many fashion spreads also feature floral patterns without feeling it necessary to comment on their representation of femininity.

All the florals displayed above are of a large scale, and have an unstructured appearance, which reflects the floral patterns in women's wear shown in the case study from Chapter Two.

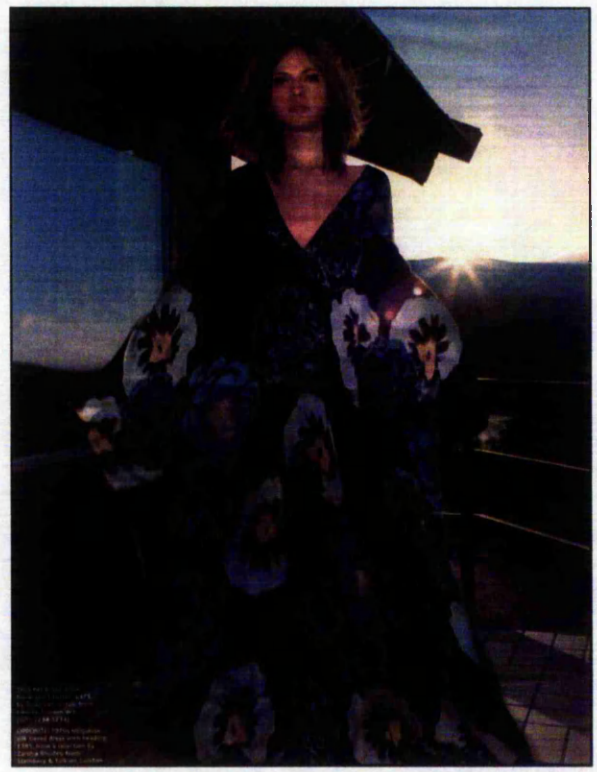

Figure 3-G: Dries Van Noten Kaftan, *Sunday Telegraph Magazine* (Irvine 2002: 37)

Florals have also been popular in menswear, though perhaps more on the catwalk than on the street. For example, Figure 3-H shows a large scale floral shirt by Paul & Joe. This image, taken from the 'Fashion Spirit' section of *The Guardian Weekend Magazine,* features a location fashion shoot from Morocco in which local men, rather than models sport shirts by well known designers (Leung 2001: 59). The nature of this style of fashion spread can be seen as more inspirational than instructive, as demonstrated by the use of the exotic location and models.

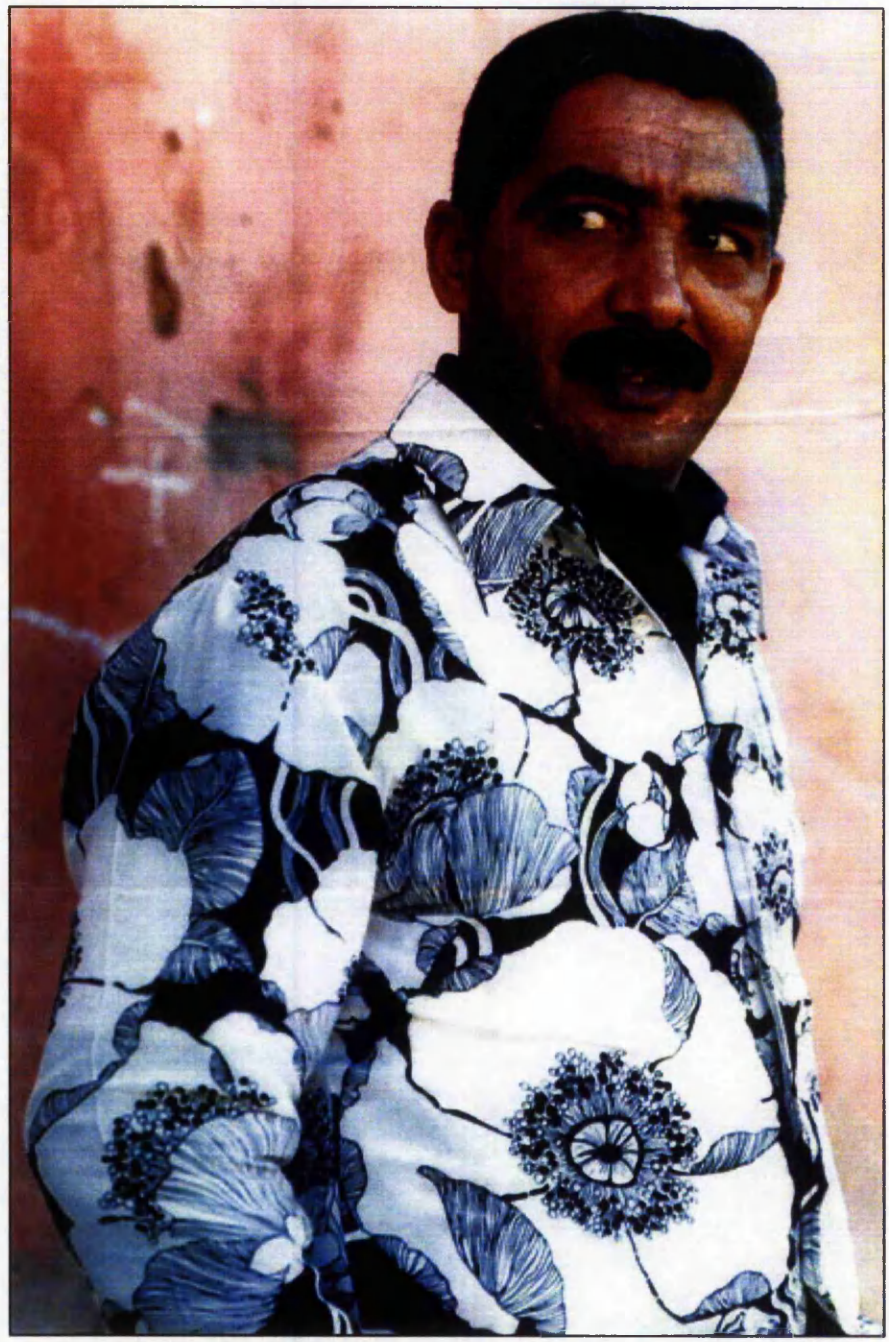

Figure 3-H. Paul & Joe shirt, *The Guardian Weekend,* (Leung 2001: 59)

The 'In Detail' section following it can be read as more informative, showing clothes

and accessories on a plain white background, with accompanying text. Figure 3-I shows a Clements Ribeiro shirt from this section. The text accompanying it reads as follows:

> Why should girls get all the floral print fun? This lovely poppy-print shirt makes a nod to summer's trend, yet the muted colours keep it decidedly masculine rather than Elton John style fashion fabulous. (Freeman 2001: 61)

I would argue that it is not just the muted colours which help create the masculine look. The flowers are of medium scale, much smaller than on the shirt in Figure 3-H, and they are arranged in loose stripes, rather than having an unstructured appearance. Both scale and structure were factors shown to contribute to a masculine appearance in Chapter Two.

Figure 3-I. Men's floral shirt, *The Guardian Weekend*, (Leung 2001: 59)

On the same page, a checked shirt is advocated for those who 'find flower prints too much of a threat to masculinity' (Freeman 2001: 61) The shirt is described as 'fabulously summery without stinting on the testosterone' (Freeman 2001: 61).

Though the fashion designers and the fashion media are creating and showing many floral designs for men, few have so far filtered down to the high street. Figure 3-J

shows some samples. It is worth noting within this selection, however, that they may all be seen as variations on the Hawaiian shirt which is something of an anomaly in gender terms, and that both *Quiksilver* and *O'Neill* are companies whose origins are in surf wear. The *TopMan* floral in the centre of the illustration is the only floral print shirt for men in the *TopMan* online store (TopMan 2002: online).

Figure 3-J: Floral prints for men, spring 2002 (from left *Quiksilver*, *TopMan*, *O'Neill*)

The feminine association with floral designs seems very much intact. The upsurge in pattern has produced a wealth of floral designs, though still far more for women than men. The fashion commentary shows not only that men need persuasion to wear something which may have feminine connotations, but that in some cases women may too.

3.3.3 Geometrics

Many of the geometric designs for women shown in fashion spreads in the last two years also complied with the floral trend of being large scale and unstructured, indicating again that a more feminine look was desirable. Figure 3-K shows a clear example of this, and could easily be mistaken for being a non-repeating pattern, due to the scale and irregularity of the lines. However, if one looks closely, the pattern can be seen to repeat. The virtually horizontal line slightly under the corsage on the right of the picture being identical to the line extending from the top of the model's left thumb. As with the large florals, the designs in this spread are described as 'bold' (Brown 2000: 10) in the accompanying commentary.

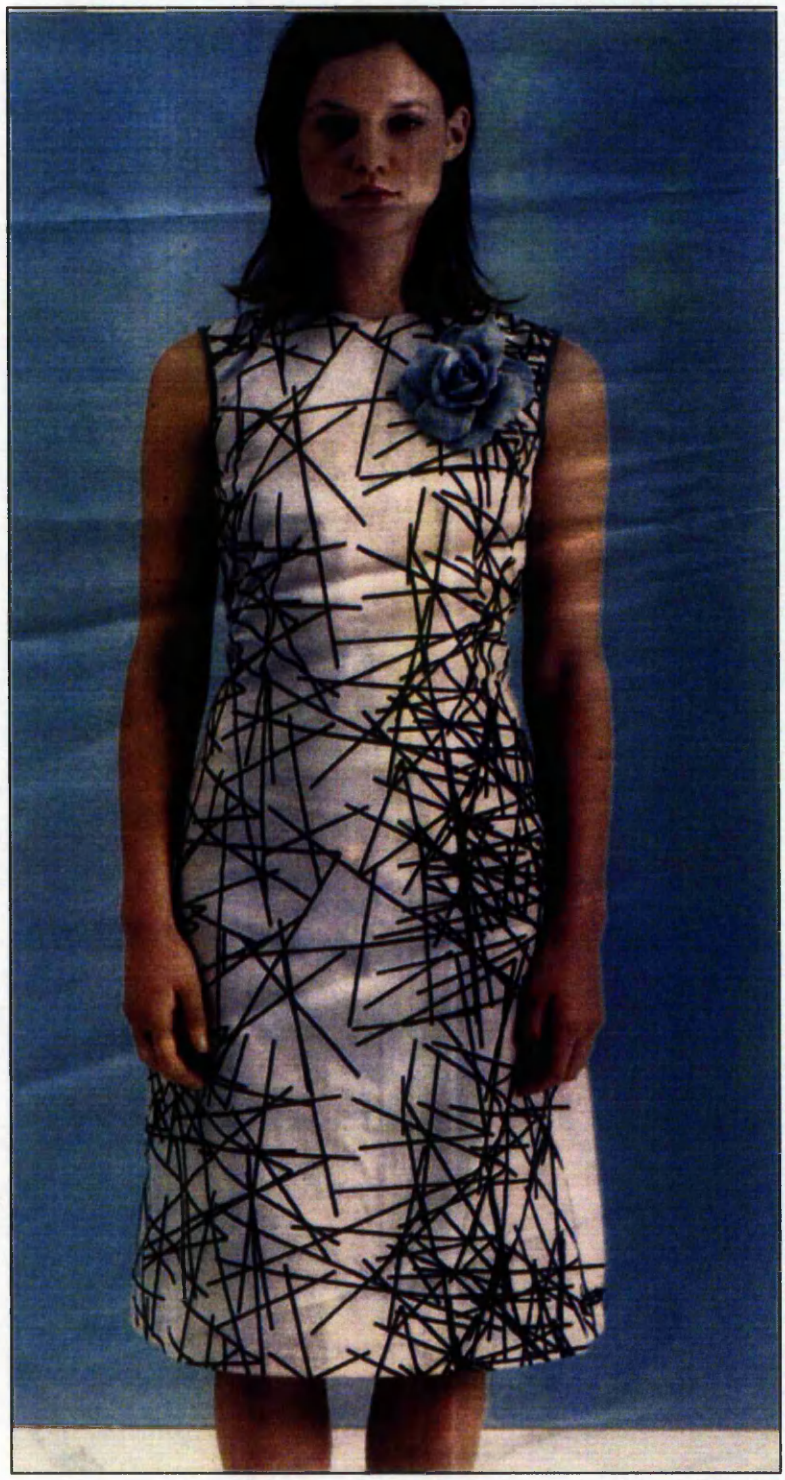

Figure 3-K: Antoni & Alison print dress *The Independent on Sunday*, (Brown 2000: 10)

Stripes are showing signs of increased popularly on women's clothes in 2002, indeed any other form of geometric print on women's wear is difficult to find. Figure 3-L shows the opening page of a recent *Vogue* article suggesting stripes are 'this year's boldest design statement' (O'Donnell 2002: 288). While stripes, with their inherent masculine values of structure and geometry may be seen as the antithesis of the current trend towards florals, it can be seen in this image, and all the others within the

article, that some feminine attributes are being used to offset the masculine connotations. Here, we can see that the predominant colour is pink, with its feminine overtones. The shirt stripes are angled, and the breast pocket has been set at a slightly different angle, giving a less regimented appearance. In all the other images of clothes in this article the stripes either: incorporate pink; use a combination of differing directions; are teamed with florals or are of widely varying sizes and colours.

Figure 3-L: Fashionable stripes, *Vogue*, (O'Donnell 2002: 288)

This 'feminising' of stripes can also be seen in Figure 3-M, where the fabric has been frilled around the neckline.

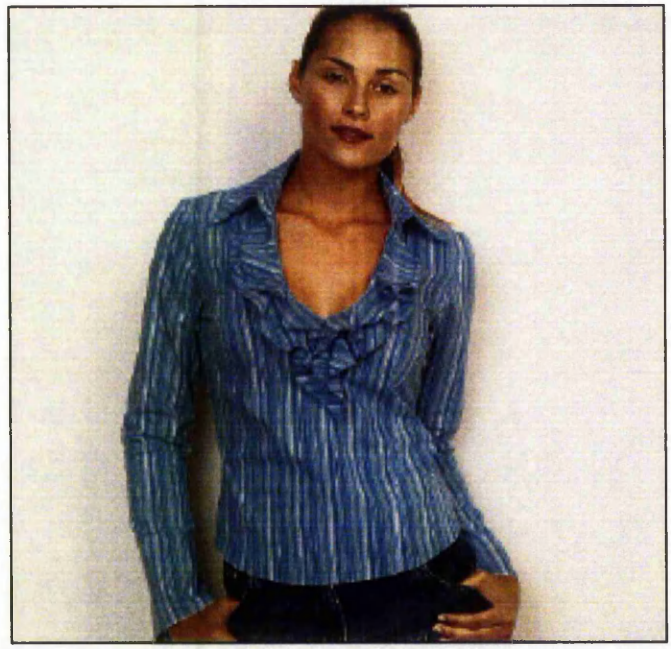

Figure 3-M: Dorothy Perkins Striped Blouse with Ruff, 2002

Stripes and checks continue to play a large and seemingly unaltered role in men's fashion. *TopMan*'s online clothing store gave a choice of 29 shirts in spring 2002, half of which could be described as traditional stripes or checks (TopMan 2002: online). The only three geometric designs which did not conform to this standard can be seen in Figure 3-N. Each of these designs has some feminine attributes offsetting the masculine nature of the geometric design.

Figure 3-N: *TopMan* Geometric Design Shirts, Spring 2002, (TopMan 2002: online)

The shirt in the centre has a small scale motif positioned in a quite rigid structure, but the lilac colouring adds a feminine touch. The other two shirts both consist of unstructured patterns of a slightly larger scale though this is offset by the tonal blue colouring of the shirts.

3.4 Summary

This chapter has shown that gender definitions have become blurred and fragmented, but that evolutionary psychology and the rise of popular science have given the media, if not the population in general a means by which to define and categorise something which is becoming increasingly hard to pin down. While the fragmentation of masculinity has led to an apparent 'crisis', the fragmentation of femininity is less discussed. The important point here seems to be that while it is still essential to be masculine, (whatever that may be), in order to be a man, it is not essential, (nor even always desirable) to be feminine in order to be a woman.

While, in the fashion media at least, there appeared to be an ambivalence towards the concept of femininity at the start of the rising trend towards pattern, there has recently been a more unanimous acceptance of it. The question remains, when the fashion media discuss being feminine, has the definition of femininity changed to something more assertive and less subservient, or is it the traditional version of femininity which they are advocating? One other puzzling aspect is the use of the word 'bold' to describe large scale or brightly coloured prints, which is almost always seen in opposition to being feminine. However, to suggest that bold prints were masculine is clearly inappropriate as they are rarely worn by men[3]. This implies that there is an opposition to feminine which is not masculine, in other words. It is difficult to find an equivalent example for masculinity, in which anything which is seen as 'not masculine' is feminine, or effeminate.

In men's fashion there is a clear move towards feminised looks, with clean-shaven youthful models being the norm in fashion spreads and advertisements. Contemporary fashion also shows a profusion of patterned designs and florals for menswear, but a brief look around any city centre, both at the high street shops, and the male consumers around them, will show that very little pattern apart from the obligatory checks and stripes is being worn.

In the five years since this research began fashion has encountered a massive upsurge in the use of pattern. Despite this profusion in the media and the shops however, it would still be fair to say that the majority of the public are still not wearing much of it. At a recent lecture to around one hundred, mainly female, undergraduates from textile, fashion, knitwear and decorative arts disciplines, only three had any visible pattern,

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[3] Though where they are worn for sport and leisure activities, they are particularly bold. The Hawaiian shirt being an example of this which supports Harvey's argument outlined in section 3.3.1 that for play, bright colours represent a different version of masculinity.

one of which was a fairly plain stripe. While this is in no way intended to be representative, it could be assumed that a group of young, female design students would be the most likely to pick up on the current trend. Similarly, the informal questioning of about fifty female fashion design undergraduates, revealed a fairly unanimous response that wearing pattern is 'too obvious' or sometimes 'too girly', or that the respondent would 'draw too much attention to themselves'. They considered pattern may be appropriate for accessories, such as bags, and for going out in the evening, rather than for college or work wear. This may link to Harvey's analysis of our work-and-play culture, considered in section 3.3.1. These issues are taken into account in the next two chapters in which the design work accompanying the research will be discussed and analysed in its contemporary context.

In this chapter we have seen how science has been popularised in the contemporary period, particularly with respect to the public or media's desire to pinpoint answers and find reasons for the increasingly unanswerable questions of life. One of the other aspects of the popularisation of science has been an increased interest in randomness and chaos theory. Scientists themselves have been looking more to nature for solutions to problems and there has been public discussion of the links between science and art. These themes will be continued in to the next chapter, in which pattern and randomness are discussed as an introduction to the design work.

Chapter 4

An Investigation into Pattern and Randomness

4.1 Overview

So far this thesis has given theoretical substance to analysing pattern on clothing and then applied it two time periods, firstly the historical period of 1967 – 1973 and secondly the contemporary period from 1997 to 2002. The methods of application varied slightly, but the basic principles involved remained the same. This chapter moves the emphasis towards the practice-based part of the work by investigating notions of pattern in Western culture and examining some of the early design experiments produced during the research. The purpose of this chapter is to explain the motivation for the design strategy developed in Chapter Five by linking the earlier theoretical discussion of the gendered pattern set with scientific and artistic experiments involving chaos, or randomness. Two continua of the gendered pattern set which are particularly relevant to this discussion are the regularity and geometric/organic continua. Use of the regularity continua has its origins in the cultural duality of order/chaos while the geometric/organic continuum is associated with the culture/nature and mind/body dualisms.

As will be seen in Chapter Five, two of the important practical considerations of the work are the use of computers and the production of patterned fabric. Both of these concepts can be considered as aligned with order, structure, and hence masculinity. While computers are necessarily aligned with the masculine attributes of logic and technology, patterned fabric is usually associated with a repeating pattern structure, which inherently endows the design with order. This may seem a contradictory notion as Chapter One clearly showed the concept of pattern on clothing to be a feminine one, however, Chapter Two and to some extent Chapter Three showed that the most feminine patterns were those in which the repeating structure was difficult to see. The developing design strategy will, hence, be adopting strategies which remove or alleviate the order of repeating fabric patterns while maintaining some degree of continuity. This development, then, requires the examination of the regularity and geometric/organic continua in different design experiments. This will help to establish methods of production for the design examples.

The chapter begins by investigating the meaning of pattern and the notion of repetition, using authors who have studied the concept of pattern from many different perspectives. The human attraction to pattern and the key features required to provide that attraction will also be considered. This is followed by a discussion of images which have been produced by introducing some element of randomness. The images

discussed come from both the scientific and fine art world. The scientific images include visual representations of chaos theory, non-repeating patterns and computer software which produce random images according to a predetermined set of criteria. The fine art section will concentrate on a selection of artists who produce what is known as generative or algorithmic art. The artists have been chosen as those whose work is, in one way or another, in closest proximity to the design practice of this project. As with the scientific images produced by computer, these artists use software to produce images which vary according to specific criteria. However, the focus here is on the artistic intent rather than the mathematical or computational process. Finally, the chapter will demonstrate some of the design experiments which lead to the development of the design strategy in Chapter Five.

4.2 Pattern and Repetition

This section will discuss the relationship between pattern and repetition and considers whether one must necessarily imply the other. Pattern is often taken to simply mean repetition, as Justema (1972: 19) says 'In the minds of many people, that's all there is to it.' In defining pattern as 'a design composed of one or more devices multiplied and arranged in orderly sequence' Christie (1969: 1) doesn't limit himself to strict repetition as the foundation, but more as an element of pattern construction. In her doctoral thesis, Bunce (1993) describes pattern as an ordering of chaos, emphasising how the cultural definitions of each shift over time.

Repeating patterns have long been the norm in textile production and the commercial reasons for this will be discussed in 4.4.1, but there are also important aesthetic ones. The structuralist view considered in Chapter One informs us that it is an inherently human desire to order, categorise and separate into distinct classifications, but while structuralism has been criticised and questioned in many ways, it is indisputable that ordering and categorising are human traits. This desire extends to vision, where patterns are sought and created in the images around us. Albarn et al (1974: 20) state that '...the ordering drive is such that the brain will always attempt to 'see' a pattern.'

One particular form of pattern uses symmetry to give an even structure to the design. Mathematician Ian Stewart sees symmetry as something 'our brains seem especially able to grasp and manipulate' (in Stewart & Golubitsky 1992: 257). Other studies have shown it is much easier for people from Western cultures to remember a symmetric pattern than a random one (Deregowski 1980: 59). However, symmetry also gives the brain less work to do in its recognition of pattern. Albarn et al (1974: 20) consider

symmetry in the following way:

> Concerned as it is with balance, it is perhaps the first conceptual device we employ to order experience. And so we apply considerably more attention to an asymmetrical problem in an unconscious search for symmetry and balance.

Phillips and Bunce (1993: 7) consider repeating structures to be a 'crucial element of pattern design', adding that 'a well-designed pattern always gains by repetition'. A repeating structure can vary, however, from very simple to extremely complex and as Gombrich (1979: 11) states 'The monotonous may fail to register while the intricate may confuse'. In other words, a pattern which consists solely of a single simple motif repeated on a grid structure, our brains will probably spend little time in its analysis. The converse, when a very elaborate pattern is presented whose structure is difficult to ascertain, may cause the brain to 'give up' attempting to analyse it when no patterns are readily found. Justema (1972: 25) states that 'although repetition is what makes a pattern a pattern, variation is what makes a pattern rewarding'. As we gain understanding of a regular pattern from experience, we become open to new stimuli. Albarn et al (1974: 20) describe this as 'a state of receptivity and "imbalance" – a dynamic state of "flow"'.

4.3 Contemporary forms

Images with a degree of repetition and an element of randomness are readily available in contemporary culture. Some of these images are the by-products of mathematical theory, which nevertheless capture the public imagination. Others are produced by artists, who, recognising the capabilities of modern computer technology, have seized upon the opportunity to extend their imaginations by using or developing software which allows for elements of chance to be present within the production of their artworks.

4.3.1 Scientific imagery

The heightened popular awareness of science towards the end of the twentieth century, partially described in Chapter Three, can also be linked to the popular awareness of the recently formulated mathematical concept of chaos theory and the related area of randomness. Mathematician, Ian Stewart has provided several cross-over texts which appeal to scientific and lay-audiences alike. Two of them with particular relevance are: *Does God Play Dice?: the Mathematics of Chaos* (1992) and the co-written, *Fearful Symmetry: Is God a Geometer?* (1992), both of which explore

symmetry, randomness and chaos in the natural world. Ian Stewart also presented the 1998 Royal Institute Christmas Lectures in which the same themes were explored in a series of televised lectures for a wider audience. Chaos theory is concerned with unpredictable systems such as weather prediction, in which application of the same set of initial parameters leads to different results on different occasions. Chaos theory shows that very small differences in environmental conditions build up to large discrepancies as the system grows. Popular shorthand for this is 'the butterfly effect'[1].

Jurassic Park, the novel, and more significantly the 1993 film that it spawned can be seen as both stimulating and reflecting this popularity. But it was not just the concept of chaos theory which captured the public imagination; chaos theory produced its own set of images called fractals which were fascinating to look at without any requirement to understand the mathematics behind them. In fact the novel, *Jurassic Park*, is divided into sections entitled: first iteration, second iteration, etc., each of which is illustrated by a fractal in its various stages of construction (Crichton 1991). The imagery and production of fractals will be discussed below, as will another mathematically produced pattern: the Penrose tiles. Finally, within the section of scientific imagery, 'random art' produced by scientists with little motivation other than to explore the capabilities of their software will be discussed.

4.3.1.1 Fractals

A fractal is 'a geometric figure in which an identical motif repeats itself on an ever diminishing scale.' (Lauwerier 1991: xi) However, the images that captured the imagination of both mathematicians and the general public are not those that follow the fixed rule of simply reducing the size and adding it to the original, but those in which an element of chance has been introduced. For example in Figure 4-A, a tree has been created by iteratively reducing the size of the basic 'Y' shape of the trunk and then adding it to the trunk. The result is a stylised, symmetrically perfect tree. In Figure 4-B, the parameters given to the computer program that draws the tree have been altered to include a random element that allows the length of the left-hand fork of the 'Y' to vary very slightly in length. The result gives the impression of a windswept tree, much more closely associated with nature. This chance element provides the link with chaos theory, in which, very simply speaking, a minute change in one place may have an enormous effect in another. Many natural phenomena can be modelled with

[1] 'A butterfly flaps its wings in Peking and weather in New York is different' (Crichton 1991, p76)

this technique, with one of the easiest to envisage being a fern frond, where each leaflet takes the same form as the frond itself.

Figure 4-A: mathematical Pythagoras Tree (Lauwerier 1991: 148)

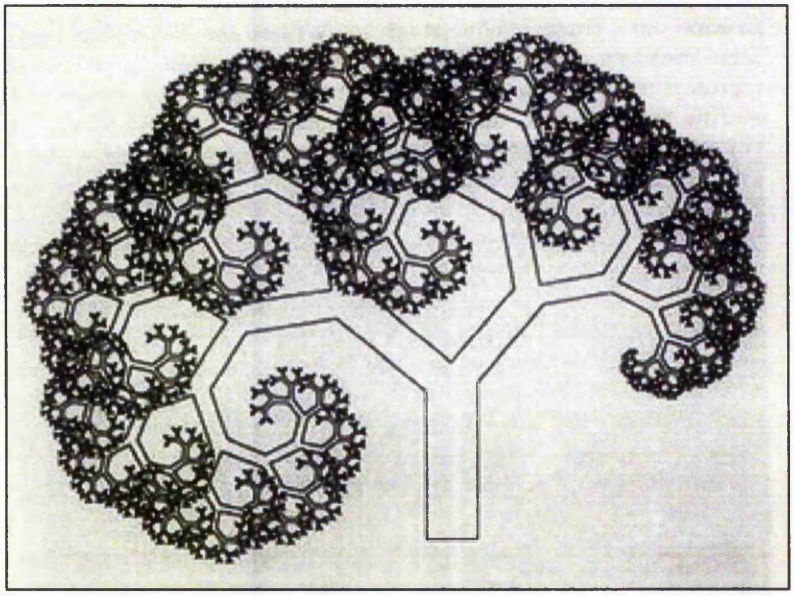

Figure 4-B. Randomly deformed Pythagoras Tree (Lauwerier 1991: 148)

Figure 4-C shows a computer generated fractal representation of a snowflake, which Briggs describes as 'somewhat unreal because they are too symmetrical' (1992: 95). This can be compared with the real snowflake in Figure 4-D, in which each of the six points are slightly different, affected by the small changes in the forces affecting them. Briggs describes snowflakes as 'fractal records of the changing circumstances the ice encountered during its descent.' (Briggs 1992: 95)

Figure 4-C: Fractal Snowflake (Briggs 1992: 95)

Figure 4-D: Real Snowflake (Briggs 1992: 95)

Perhaps the most widely known images are those which are created from the Mandelbrot set, discovered by Benoit Mandelbrot, inventor of fractal geometry in the early 1980s. The rise of personal computers in the 1990s gave many lay-people access to their own fractal generator, in which the colours could be selected, and the level of 'zoom' determined, so the user had some control over the resulting fractal images. Figure 4-E shows an example of this type of image. These images proved to be incredibly popular with both scientists and the public alike (Briggs 1992: 80).

Lauwerier describes the fractal without a random element as 'too beautiful... too strictly mathematical' (1991: xi). Importantly, it seems, it is the element of chance that makes these images more appealing, and more 'natural'.

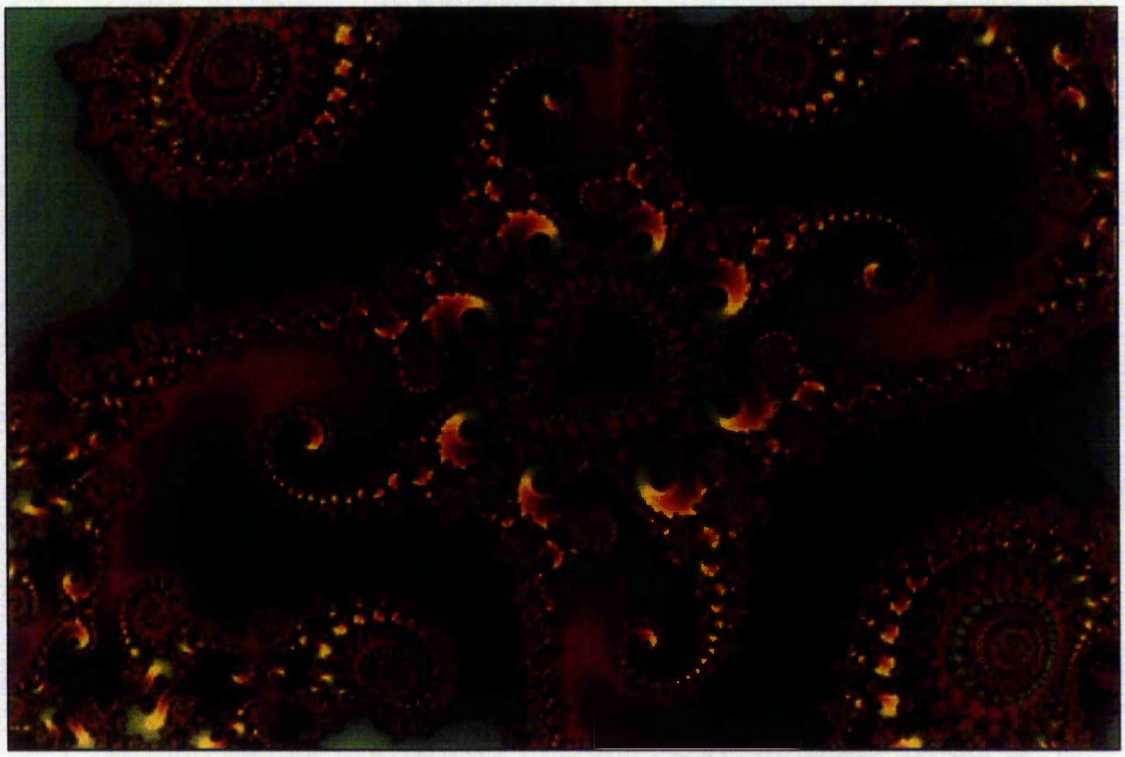

Figure 4-E. Detail of Mandelbrot set, computed by Rollo Silver, (Briggs 1992: 79)

4.3.1.2 Penrose Tiles

Another type of scientific image was created by Mathematician Roger Penrose, who discovered two five sided shapes which it is possible to tessellate, (according to strict rules), in a manner which never repeats, see Figure 4-F. These tiles have now been used to form the basis of puzzles rather like jigsaws, and have also been utilised practically in two commercial products. The first, in which the pattern is not visible to the naked eye, is a non-stick frying pan coating in which the crystals are arranged in Penrose tile formation to give a tough and slippery surface (Voss 1999: 44). The second became rather more famous, as it resulted in a legal dispute over copyright. Kimberly Clark (Kleenex) used the Penrose tiling as a design on embossed toilet paper, but didn't ask for permission first (Dutter 1997: online). According to Penrose, the design was good for embossed toilet paper because the lack of repetition prevented the paper forming an uneven roll, with lumps where the embossed parts of the pattern meet (Penrose 2000: radio).

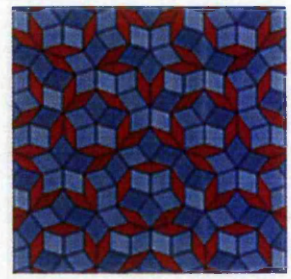

Figure 4-F. An example of Penrose Tiling (Lindblad 1998: online)

In mathematical terms, this non-repeating pattern is called a non-periodic tiling, though it is often referred to as quasiperiodic because:

> Unlike a pattern made from identical building blocks, a quasiperiodic pattern doesn't exactly repeat over short distances. The Penrose tiling looks cockeyed close up, yet over large distances the tiles tend to form repeating patterns with five-fold order...(Voss 1999: 44)

One of the intriguing elements of Penrose tilings lies in the fact that it appears to repeat but does not do so in the normal way, although repeated clusters of elements may be spotted on a large surface. This combination of order and disorder provides a pattern which is constantly challenging through its lack of repetition, yet comforting through the use of continuously familiar elements. This style of thought in pattern design will be demonstrated to be crucial to the design strategy.

4.3.1.3 Random Art Works by Scientists

One final source of scientific random images is of those which are not produced as a by-product of scientific work, but are produced for their own sake by scientists usually indulging in a pastime or hobby. Many web sites are available in which this type of randomly generated image can be viewed. Samples of these images have been included more for completeness and demonstration of computer technique, than to show proximity with the practice of the project.

More often than not, the software controlling these images is not coded with parameters to control aesthetic content, though some sites, such as the one constructed by Slovenian Mathematician, Anrej Bauer, allow the viewer to vote on whether the computer has produced a 'good' or 'bad' image (Bauer 2001: online). Figure 4-G and Figure 4-H show examples of work most disliked and liked by viewers on the date of access. In these examples the computer is given a set of equations which are selected randomly in order to produce the images. Bauer makes no artistic judgement over the outcome at the time of programming or executing the program.

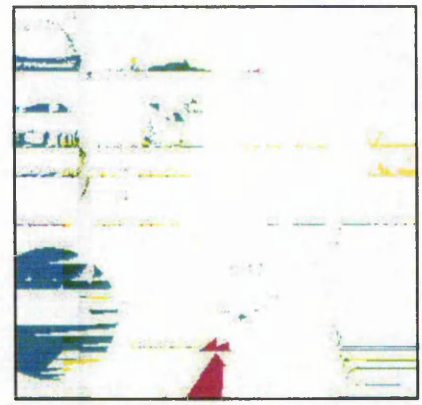

Figure 4-G: Random Art from Bauer's web site, voted 'bad' by viewers (Bauer 2001: online)

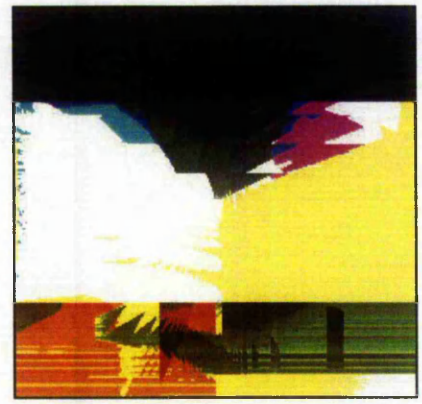

Figure 4-H: Random Art from Bauer's web site, voted 'good' by viewers (Bauer 2001: online)

While Bauer is addressing the aesthetic qualities of the images produced by the software after their production, by giving viewers the ability to vote on them, he does not provide any parameters within the software to control the aesthetics of the resultant images. Many artists, however, have used chance elements along with their aesthetic sensibilities to provide interesting and varied works of art.

4.3.2 Fine Art Works

Most art contains an element of chance, but many twentieth century artists have exploited the chance elements. In Jackson Pollock's splatter pictures, for example, the fall of the paint could never have been exactly determined. Other artists have used chance in a more deliberate way, using dice rolling or other random elements to determine position, colour, shape or texture of a particular element. This is often seen as a useful method of freeing the mind, allowing elements the artist may not have consciously considered to be put together, while still giving them ultimate control in the finished result.

Howard Cohen, in 1968, was probably the first artist to create his own computer system for drawing, and adapted it to his own conventional painting style. He gave the

computer many motifs and images in his own artistic style and then instructed it to randomly select which of them would appear in what position on the canvas. Massive paintings were produced using a plotter, some of which were later hand-coloured by Cohen (Goodman 1987: p58-60).

The four artists below represent a selection of contemporary artists whose work is described as algorithmic or generative, in that software has been designed to produce images that have some level of randomness incorporated into them. Unlike the random images produced by scientists as described in section 4.3.1.3, these works are nearly always inspired and informed by the artist's conventional work, and aesthetic judgements are made at many stages throughout the process. Each of these artists shows some relation to the design examples produced in this work.

4.3.2.1 Roman Verostko

Verostko is a painter whose conventional work examined the boundaries between order and chaos. His exploration into the use of computers in art led to the development in 1988 of his own software which allowed a computer to drive a plotter connected to a paintbrush. His software uses algorithms which mimic the traits of his conventional painting style, while parameters are added which introduce chance into the object placement and line style. His interest in balancing control and uncontrol in his work is met through the combination of controlling parameters and random elements in the software (1988: online). Verostko uses the programming language *BASIC* to produce his software. The variation from control to uncontrol varies from piece to piece and is manipulated by 'monitoring work and ... [making] changes along the way' (2001, interview).

Figure 4-I shows a pen and ink plotted drawing entitled East-West 2 from his Polarities series. The lines on the drawing are given their meandering qualities through the random elements of the software controlling scale and direction. However, the lines are also subject to controls which restrict their scale and direction within specific boundaries set by Verostko (2001: online). Another level of control, or order, is added through the mirror symmetry displayed through the vertical midline.

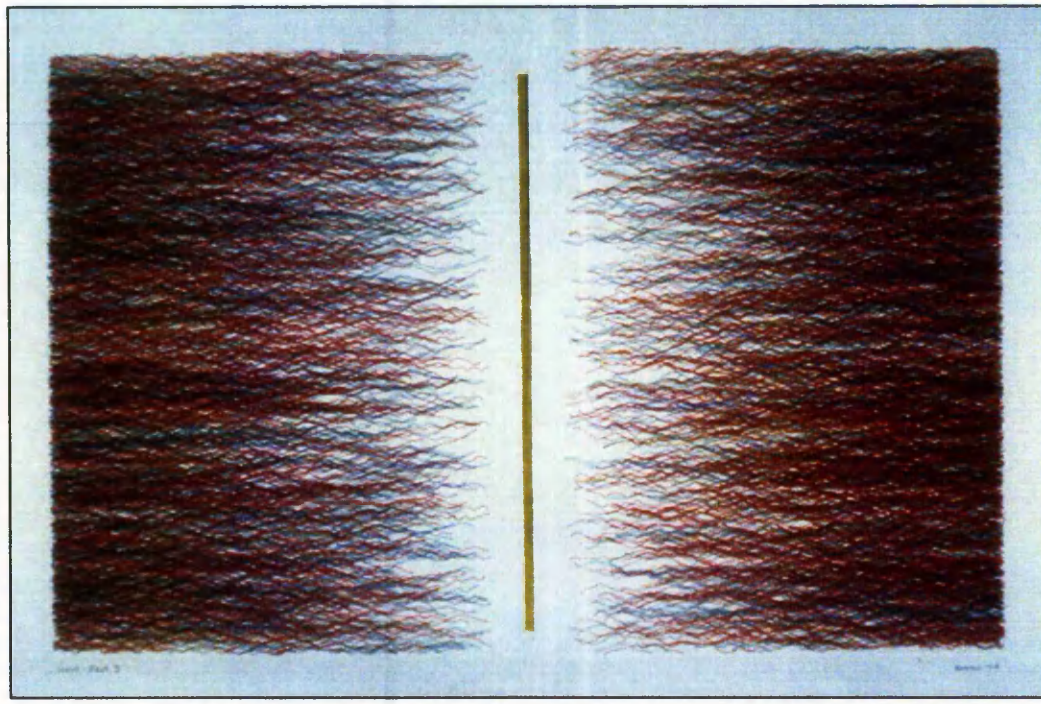

Figure 4-I. 'East - West 2', Roman Verostko, 2000

Figure 4-J, *Two Thousand Improvisations, v3* was created to celebrate the millennium, using a pen plotter on paper. Each of the two thousand motifs are unique and generated by the software according to Verostko's parameters (2001, interview). Figure 4-K shows a section of the drawing in close up in which the individual elements can more clearly be seen.

Verostko's work highlights the balance of order and chaos, or control and uncontrol, in his work and makes aesthetic judgements on that balance as his work progresses. His approach is very relevant to the design work of this project.

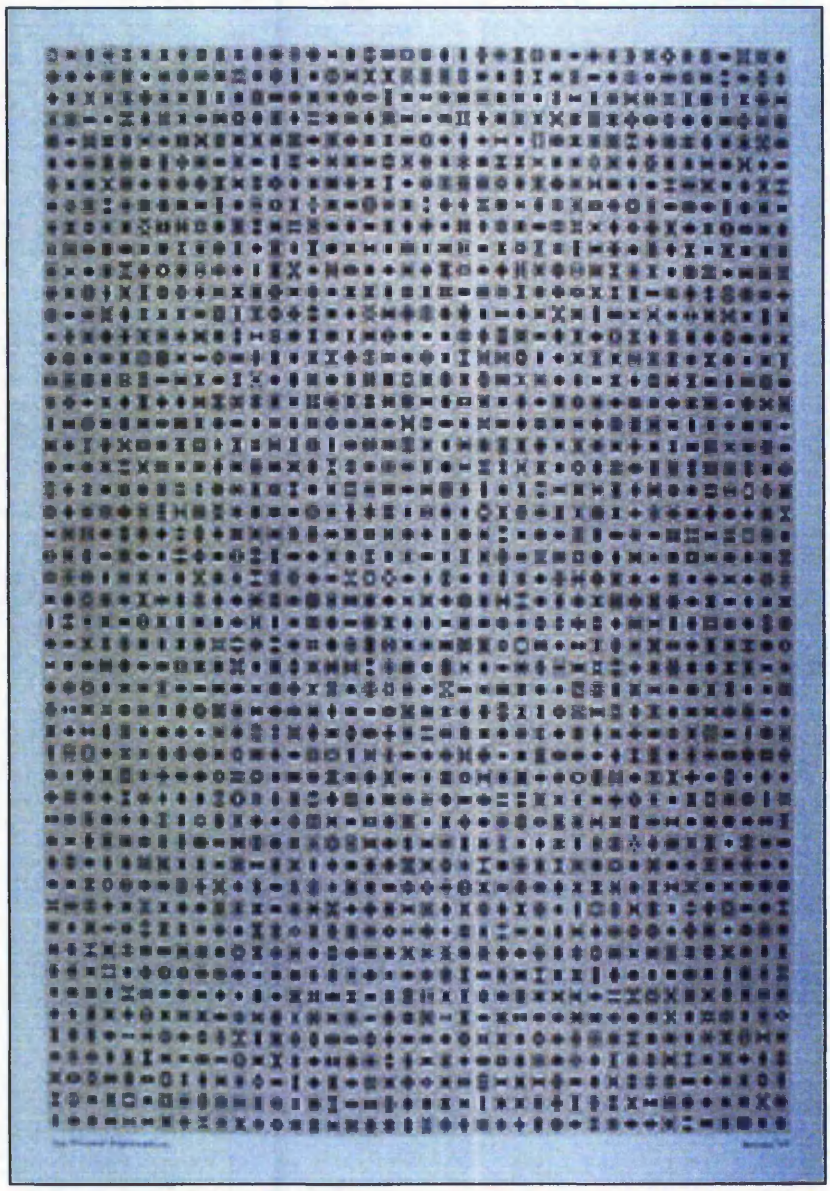

Figure 4-J: 'Two Thousand Improvisations, v3', Roman Verostko, 2000

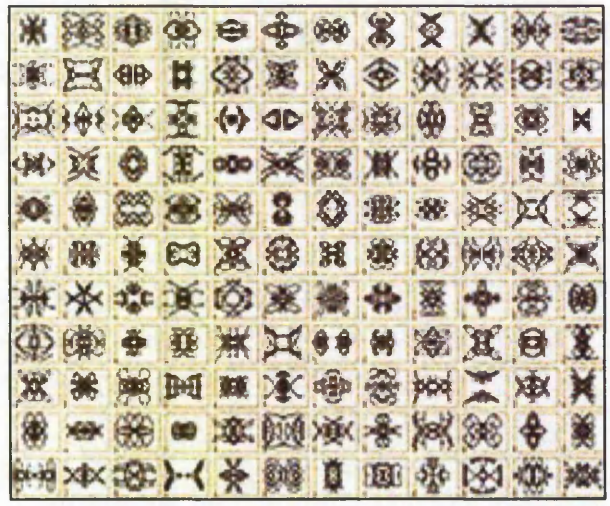

Figure 4-K. Close up section of 'Two Thousand Improvisations, v9', Roman Verostko, 2000

4.3.2.2 John Maeda

John Maeda's technical background at the Massachusetts Institute of Technology, followed by conventional art training in Japan, has given him the freedom to explore his artistic creativity through computers (Maeda 2000: iii). His images are created using the programming language *C*, but his primary aim is to produce intuitive software for designers, which will remove the need for them to learn difficult programming languages in order to produce their work (Chiswick 2000: 26). Maeda doesn't describe his techniques and control over parameters in the way Verostko does, but following his art training he has been seeking to instil the 'basic imperfection' found in traditional hand-produced work in his computer-based work:

> ...I'm interested in how you make something that's inherently perfect, but imperfect in a way that will speak to people. A lot of what I'm looking at is how you get away from the repetitive kind of mechanism. But at the same time stay inside the scope of what it means to be in dialogue with a machine that can be repetitive for ever. (Maeda in Chiswick 2000: 26)

In both Figure 4-L and Figure 4-M it is possible to see that some parameters of control, and some elements of uncontrol have been utilised. Figure 4-L gives the impression that it may be a repeating pattern through the similar sized shapes and uniform spread of colour; however by looking closely it is possible to see that each line is slightly different to the last. Figure 4-M is different in that the positioning of the circles has created a single motif, but again the spread, size and colour of the dots suggest random elements encoded into the software. With an image like this one must also assume that, as with Verostko's work Maeda intervenes when he feels it to be aesthetically 'right'. He confirms this with the following statement:

> Once encoded as a programmatic form, the computer becomes a literal design machine, capable of rendering endless variations on a basic theme. The foremost challenge in operating such a powerful tool is the same as with the simplest tool: there must always be a clear initial concept that can guide the process to a relevant outcome. (2000: 32)

Maeda's interest in breaking what he sees as the perfection produced by computers in order to make an image more interesting and more 'humane' (in Chadwick 2000: 27) bears many parallels with the fractals described in 4.3.1.1, in which the most interesting ones are those which are not quite symmetric or perfect, and which in turn mimic nature, where prevailing environmental conditions usually cause imperfections in growth. This can be allied to the design work of this project in its attempts to undermine the order and rigidity often produced by a repeating pattern.

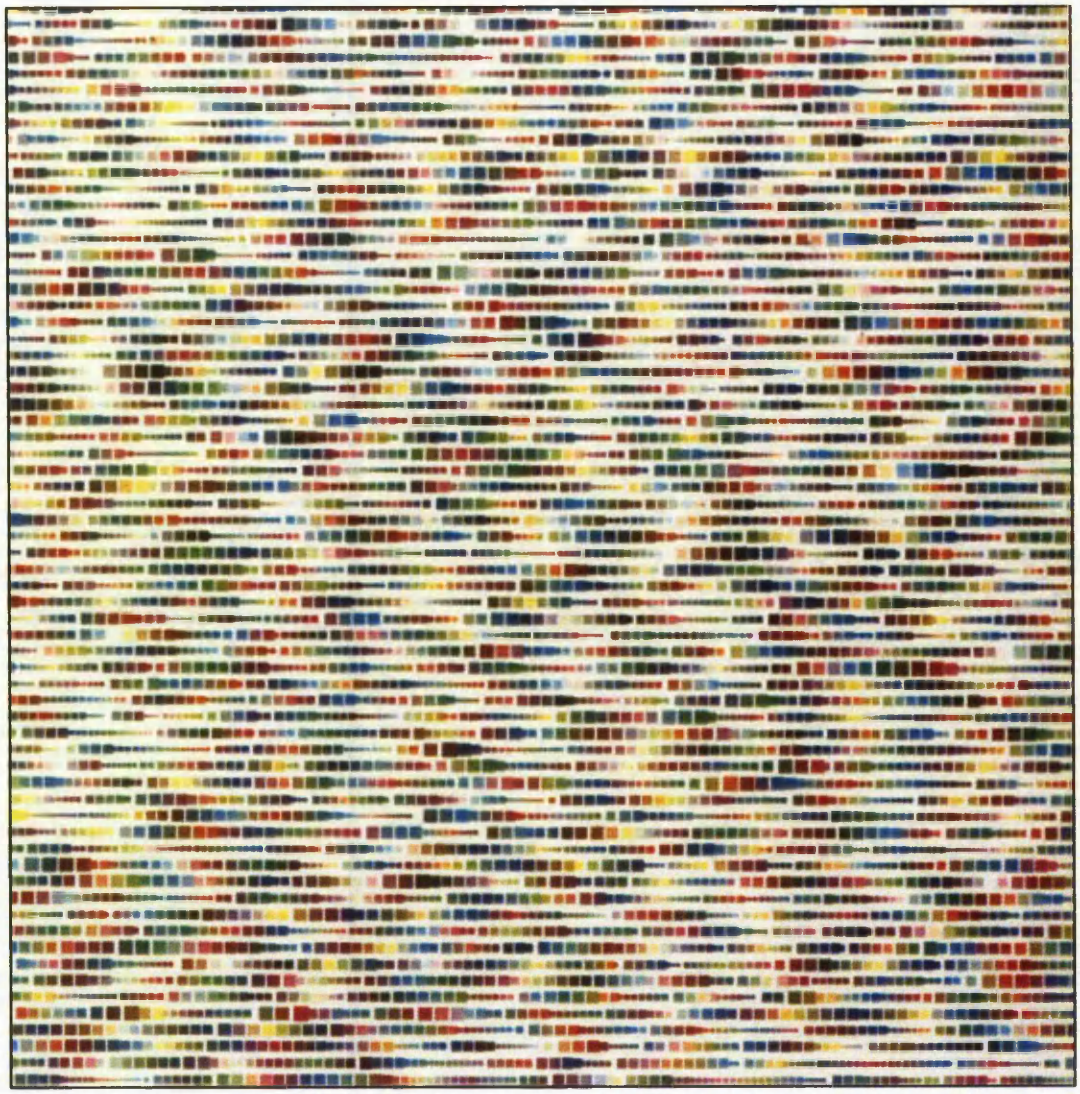

Figure 4-L: John Maeda, section of a design from the Four Colour Series (Maeda 2000: 230)

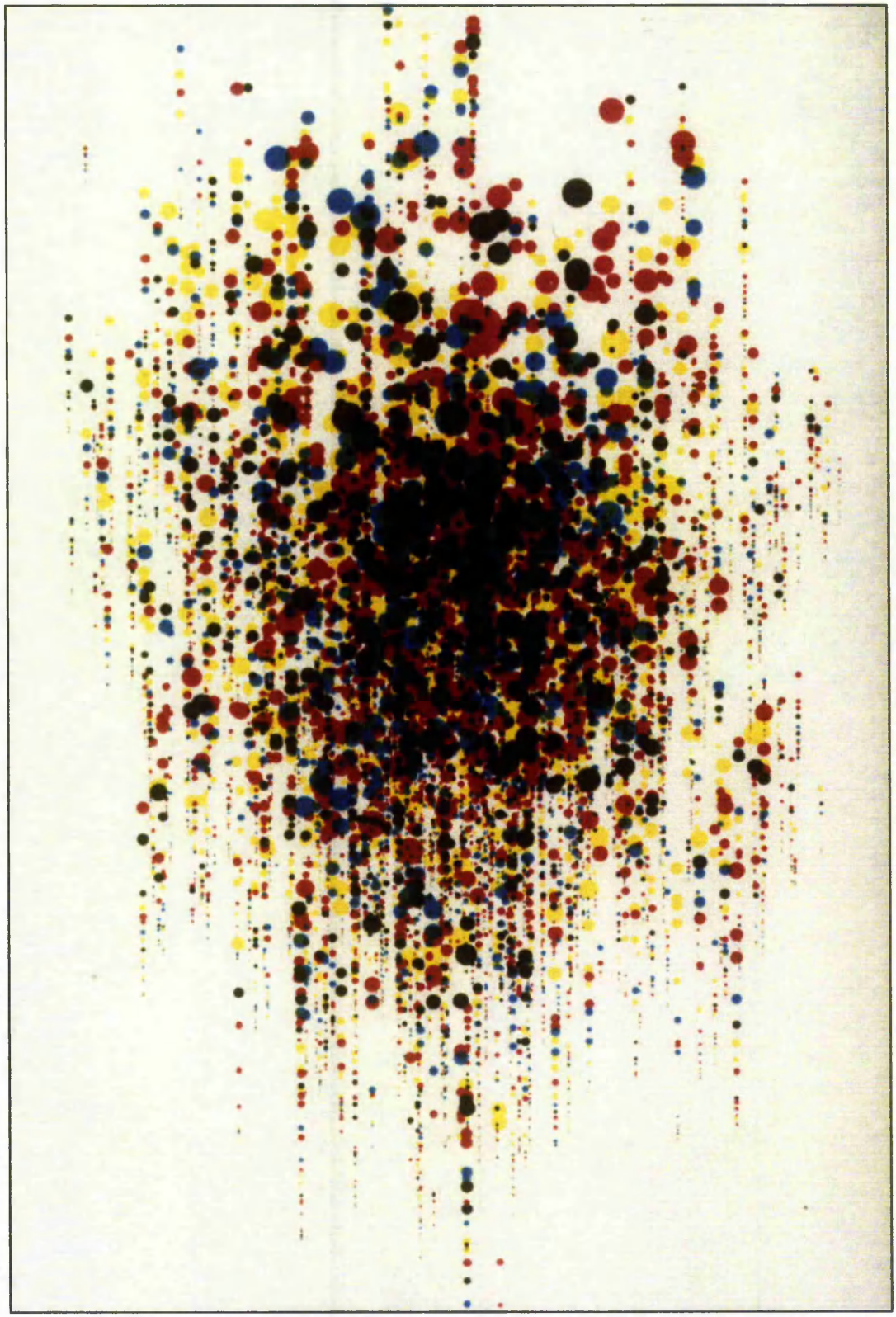

Figure 4-M: John Maeda, Design from Four Colour Series, (2000: 232)

4.3.2.3 Kenneth A. Huff

Kenneth A Huff has identified a desire to reproduce the imperfections of nature in his work in order to remove the artificial appearance which 'perfect' computer designs can give. Using a variety of commercially available software, Huff takes natural forms such as honeycombs and sunflowers to inspire and inform his work. These natural examples of repetition are not, however, perfect:

> While these patterns contain recognisable structure, they also have imperfections or a level of randomness. Computer-generated imagery often contains similar patterns, but frequently without the subtle imperfections found in nature, thus alerting our minds to the synthetic aspects of the image. (Huff 1999: 209)

Huff uses non-periodic tiling patterns (non-repeating patterns) to give 'an appealing structure along with natural randomness' (Huff 1999: 209). The underlying non-periodic tiling pattern is created by producing square tiles which contain curved lines that extend to the edge of the tile. By placing them next to each other in a random order, longer lines and squiggles appear on the design. These patterns are often layered together, some at different scales to give extra interest and depth. *99.1* (Figure 4-N) is an example of this. *2000.27* (Figure 4-O) is what he describes as a 'Truchett Pattern'. These patterns use cubes, rather than squares as the tiling unit, giving a three-dimensional appearance to the work as 'a volume is filled with continuous curves' (Huff 2000: online).

As with Maeda's work, inspiration from nature is being used to balance the regimentation of the constructed form. Using a tiled approach gives the art works a sense of continuity without repetition, similar in concept to Verotsko's image shown in Figure 4-J. This technique will also be shown to be useful in the design examples of this project.

Figure 4-N : 99.1 by Kenneth A Huff, (Huff 1999: online)

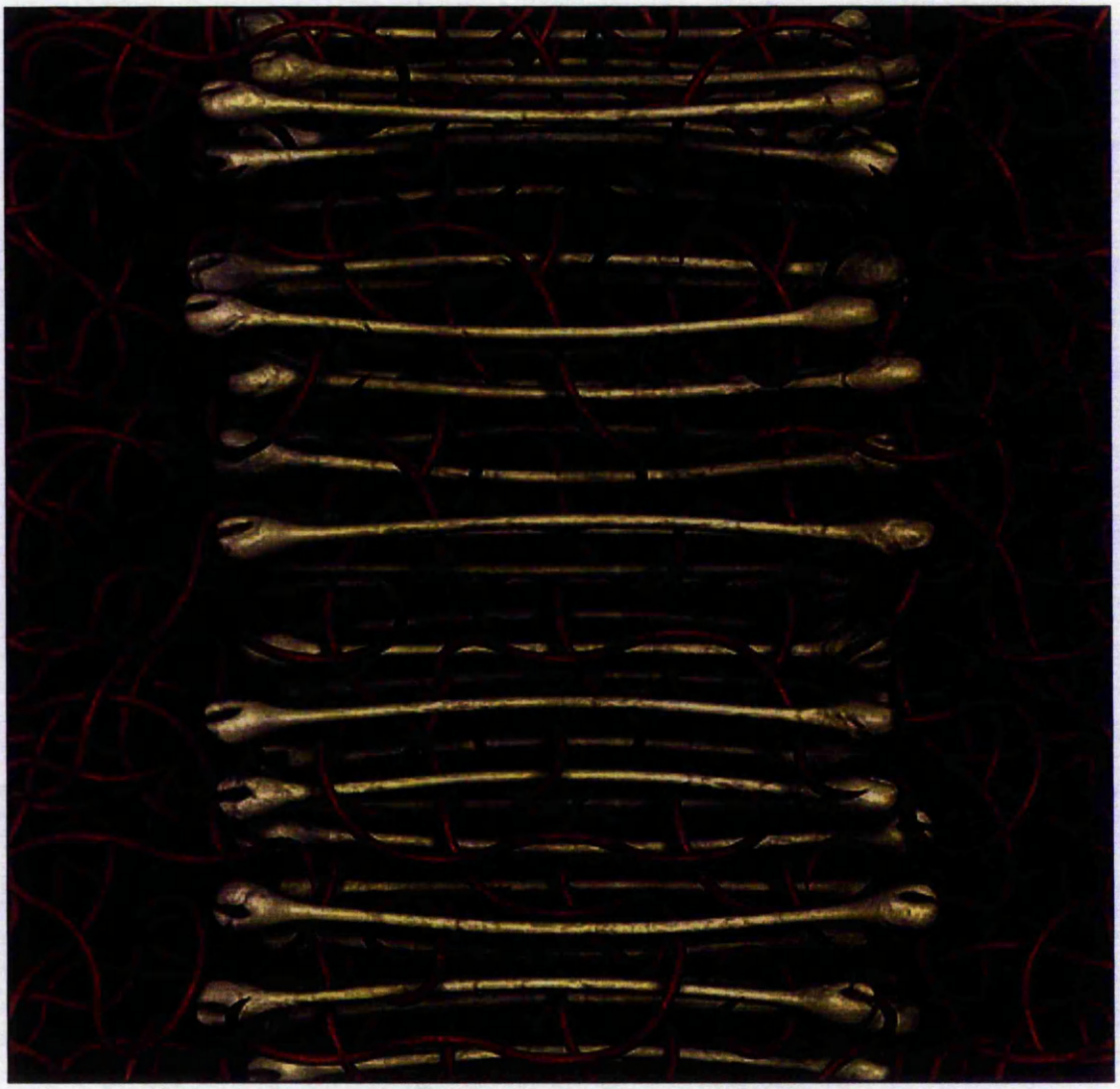

Figure 4-O: 2000.27 by Kenneth A Huff, (Huff 2000: online)

4.3.2.4 Paul Brown

Paul Brown is a fine artist whose work is probably most closely associated with the creative work of this project. Through artistic desire, rather than commercial or aesthetic restraint, he produces computer-aided works with random elements, often using simple motifs based around a grid:

> My thirty year obsession has been tiling systems and the belief that simple elements can be permutated together to produce images where ... "the whole is greater than the sum of the parts" (Brown 1996a: online)

Both *English Summer* (Figure 4-P) and *Fleshtones* (Figure 4-Q) have been created this way. Though *Fleshtones* looks complex on first viewing, closer inspection reveals it to be made up of one motif, rotated randomly. The motif has two linking points on each edge of its square boundary, so that the finished design has much cohesion. As far as

it is possible to ascertain, designs like *English Summer* are manually created using software such as Freehand and PhotoShop, with the random selections constructed separately, as with the initial design work in section 4.5.

Fleshtones is a snapshot of one of Brown's time-based works, *Chromos* (Brown 2000b: online), which follow rules in a similar manner to Conway's Game of Life[2] (Brown 1996b: online). The time-based works are constructed using the *Director* animation software, while the snap-shots are enhanced with *PhotoShop* and *Freehand*.

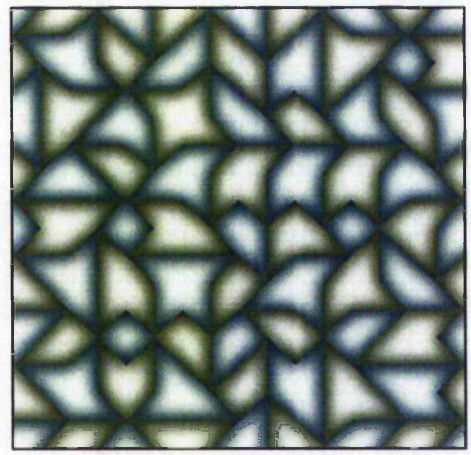

Figure 4-P. 'English Summer' by Paul Brown, (Brown 2000a: online)

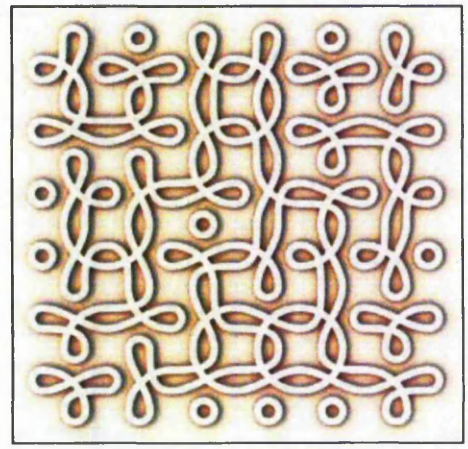

Figure 4-Q. 'FleshTones' by Paul Brown, (Brown 1999: online)

As with Huff, and some of Maeda's work, Brown's images often give a feeling of complexity and intrigue as one attempts to unravel or decipher the underlying pattern.

In all the computer-based examples shown, random elements are used to attempt to

[2] Conway's Game of Life is a mathematical pastime invented by mathematician John Conway. Simple genetic rules of birth, survival and death are applied to a basic configuration of organisms (represented by counters) in order to show them evolving with unpredictable behaviour of the population. (Gardner 1970, pp120-123). Many versions of this game are available on the internet.

loosen some of the control over the resulting image. Similarly, all the artists use both parameters within the programs and their own artistic judgement to produce their finished works.

4.4 Locating the Design Work

This chapter has investigated the concept of pattern in order to come to an understanding of its constituents and elements and discover which are necessary and which are there by virtue of tradition. Essentially, it has been shown that strict repetition is not required in a pattern, but that the use of some form of continuity, symmetry or repeating elements is most likely to produce a visually interesting pattern. Both the scientific and fine art imagery discussed, with the exception of the scientific random images in which no aesthetic intervention was applied, adheres in some way to these criteria. It also all, whether through design or inherent qualities, contains some non-repeating element.

The design work of this project provides a textiles-based response to these considerations of pattern in the form of non-repeating patterns. The very notion of a non-repeating pattern lends itself to consideration of the four continua derived from the gendered pattern feature set in Chapter One. Most obviously, 'non-repeating' implies a lack of order which places it at the opposite end of the regularity continuum from a repeating pattern. However, as we saw in Chapters Two and Three, scale plays an important part in how regular a pattern appears; a large repeating unit is often not identifiable due to the garment size and construction. Most of the scientific and artistic images discussed have associations with nature, in that their construction either attempts to replicate natural forms, or uses inspiration from natural forms in order to reduce the mechanical nature of computerised imagery. The proliferation of methods and techniques which amalgamate the scientific with the natural are perhaps an indication of a cultural tendency away from the nature/culture duality. In the gendered pattern feature set, the nature/culture duality is represented by the organic to geometric continuum. While some aesthetic and theoretical considerations for the work have been made, it is also necessary to consider the commercial aspects of producing a non-repeating printed textile design.

4.4.1 Commercial Considerations

Mass-produced fabrics almost always contain a repeating element to their pattern design. The mechanisation processes of weaving, knitting and printing patterns have

made this a necessity for the majority of textile production. The warp and weft structure of a woven fabric, and the stitch structure of knitted fabric lend themselves perfectly to geometric-style repeating patterns. While there are no such concrete boundaries for printed fabric, economy favours repeating patterns. Commercial mass-productions of printed textiles began in the eighteenth century, and by the nineteenth century much emphasis was placed on the pattern repeat. By the beginning of the twentieth century texts on classifying pattern and directions on how a designer might produce pleasing patterns were commonplace[3], though it should be stressed that these books rarely considered pattern on fabric, especially not fabric for garment production. In the contemporary environment, anyone who has produced a tiled background for their web page or *Windows* Desktop will know that a motif which appears attractive in isolation may become unattractive in repeating formation. Often horizontal, vertical or diagonal emphasis appears which one may not anticipate through observing the single motif.

Obviously, stripes, checks, and rigidly structured designs are sometimes demanded by fashion. A bold repeat can be incorporated into the design of the garment. For example, a striped fabric could be used horizontally on the sleeves and vertically on the body of the garment, or diagonally to produce a chevron effect. Garments produced this way are distinctive and quite different in appearance to ones made from the same pattern pieces in a plain fabric, or those without a heavily repetitive design. The disadvantages of this technique are twofold: more skill is required by the pattern cutter to align the pattern pieces to the fabric and there is more wastage in the fabric itself.

Time and economy became more and more valuable in the textile industry, as with most industry, as the twentieth century progressed. This led to a move away from obviously repeating patterns to ones in which the pattern is disguised or inconsequential. A pattern of this nature allows pattern pieces to be placed in any direction on the fabric, cutting down on wastage. If a motif is scattered across the repeating unit, in seemingly random directions, there is less chance that the repeat will be obvious (Bunce 1996: p33-36). Similarly, if a large repeat unit is used with many different but similar motifs covering most of the fabric's surface, the repeat can be hidden. This is a consequence of the pattern pieces within the garment not

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[3] For examples, see Meyer's *Handbook of Ornament*, 1894; Jones' *The Grammar of Ornament*, 1856; Christie's *Pattern Design*, 1910 and Day's *Pattern Design* 1903

incorporating more than one repeat of the pattern while the similar motifs provide an overall uniformity which prevent the garment seams being obvious, however the fabric is cut.

The latter part of the twentieth century also saw a backlash against the perfection made available through the use of technology and high-level mechanisation. Whereas in the early days of mass-produced printed fabric, the most sought-after prints were those which appeared most perfectly printed, we now have manufacturers who deliberately incorporate faults to give fabric a 'hand-crafted', and hence desirable, look. Furthermore, there is now a trend towards 'uniqueness' and customisation in clothing.

4.4.2 Design Motivation

The three main constituents of the design motivation are the theoretical, aesthetic and commercial considerations of producing non-repeating textile patterns for clothing. The gendered pattern set was developed from theoretical discussion in Chapter One. Four continua of regularity, scale, geometric to organic and angular to curved were derived from it and used to analyse clothing in Chapters Two and Three. Aesthetically, the description of the artists' work above shows that all are concerned with endowing their images which some degree of control and some degree of randomness, or disorder. Most apply control both within the software, and at the post-production stage.

While the aesthetic considerations require a degree of control, specific forms of control may be required by the particularities of producing commercially viable printed fabric. Commercially the fabric would require a fairly even spread of motifs: if the program was allowed to draw motifs at random co-ordinates there may be areas of closely situated, or even overlapping motifs, and other areas with no motifs at all. Similarly, if the design contained lines that were free to randomly wiggle in any direction, they may well wiggle off the fabric print. In a third case, if the motif is allowed to stretch or contract randomly, it may quickly degrade after a series of concurrent contractions or stretches. While samples of any of these design types may provide aesthetically interesting one-off pieces, it is unlikely that they could be commercially viable as long lengths.

In the first experiments, described below, combining the effects of amalgamating the extremes of the regularity continuum, order and disorder, together with methods of presentation as viable commercial textiles, are the primary concerns.

4.5 Experimental Findings with Manual Techniques

The initial design experiments looked for inspiration in traditional repeating techniques. The ideas generated were explored, and then assessed for practicality, visual qualities and balance between order and chaos, rather than looking to achieve these qualities in the initial design criteria. After a series of experiments were carried out, their qualities could be assessed and a more formulaic and rigorous series was developed in line with those results.

In all cases the design ideas were executed through a combination of manual and computer-driven techniques. Firstly the design inspiration was explored and converted into possibilities dependant on randomness. Secondly, the computer supplied a method of generating random options in the form of the random number function[4] within Microsoft's spreadsheet package, Excel. The advantages of this over a more manual method, e.g. coin tossing or dice throwing, were that the number of different options available was much greater, a grid of options was easy to produce and reproduce with different options, and of course, speed.

4.5.1 Basic Processes

As most of the initial designs fit into the three types identified at a later stage, the documentation will analyse them by type rather than chronology. Firstly, two of the basic procedures for producing designs with a random element are detailed by describing basic examples of each. This documentation will then allow further examples to be demonstrated without the requirement of providing detailed documentation of the construction process.

4.5.1.1 Basic Process 1

The easiest way to describe the manual process for creating designs is to take the simplest example: a rectangular grid in which a motif can either be present or not present. There are then two random possibilities: 0. motif absent; 1. motif present. The spreadsheet grid is created to contain enough cells to fill the intended sheet on which the design will be drawn. Each cell contains the formula to randomly print a 0 or a 1. A sheet displaying a grid of 0s and 1s is then printed; see Figure 4-R: Grid to show single motif on/off. In *PhotoShop* the motif is copied and pasted appropriately by

[4] In Microsoft's spreadsheet package Excel, the function RANDBETWEEN(lowest,highest) gives a random number from the lowest to the highest supplied as parameters

translating the 0s and 1s from the spreadsheet into absence or presence. Figure 4-S shows the result, using this grid with a circular motif.

This type of design was identified as grid-based, in that it always consists of the placement or non-placement of a motif (or motifs) into a grid-like structure, though this is not necessarily rectangular.

1	0	0	0	1	1	0	1	0	0	0	1	1	0	1	0
0	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0
1	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0
1	1	1	0	1	1	0	1	1	0	1	1	1	0	1	1
0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1
0	1	1	0	1	1	0	1	1	0	1	0	0	1	0	0
0	1	1	1	1	1	0	1	0	0	1	1	0	1	1	0
0	0	1	1	0	0	0	1	0	0	1	0	1	1	0	1
1	1	1	1	0	0	1	0	1	1	0	0	0	0	0	1
0	1	1	0	0	0	1	0	1	0	0	0	0	1	1	1
1	1	0	0	0	1	0	0	0	1	0	1	0	1	1	1
1	0	1	0	1	0	0	1	0	1	1	0	0	0	1	0
0	0	1	0	0	0	1	1	0	0	1	0	1	0	0	0
1	0	0	0	0	1	0	0	0	0	1	1	0	0	1	1
0	0	1	1	0	0	1	1	1	1	1	0	1	1	0	0
0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1

Figure 4-R: Grid to show single motif on/off

4.5.1.1.1 Observations

This technique showed a great deal of potential for the construction of design examples. The grid structure ensures that the motifs are spread evenly over the canvas, while the binary on/off function in the particular example shown in Figure 4-S allows random shapes and patterns to be constructed as the individual motifs cluster together. Continuity is provided to the eye by the use of a single motif, while the asymmetrical shapes produced through clusters of motifs cause the eye to look for further patterns.

A wide variety of different possibilities are available with this technique: other styles of grids which allow motif tessellation, such as a honeycomb, could be used as could variation in style, scale and orientation of the motifs. The grid structure has been used by other artists such as Verotsko, (see Figure 4-J) and Brown, (see Figure 4-P).

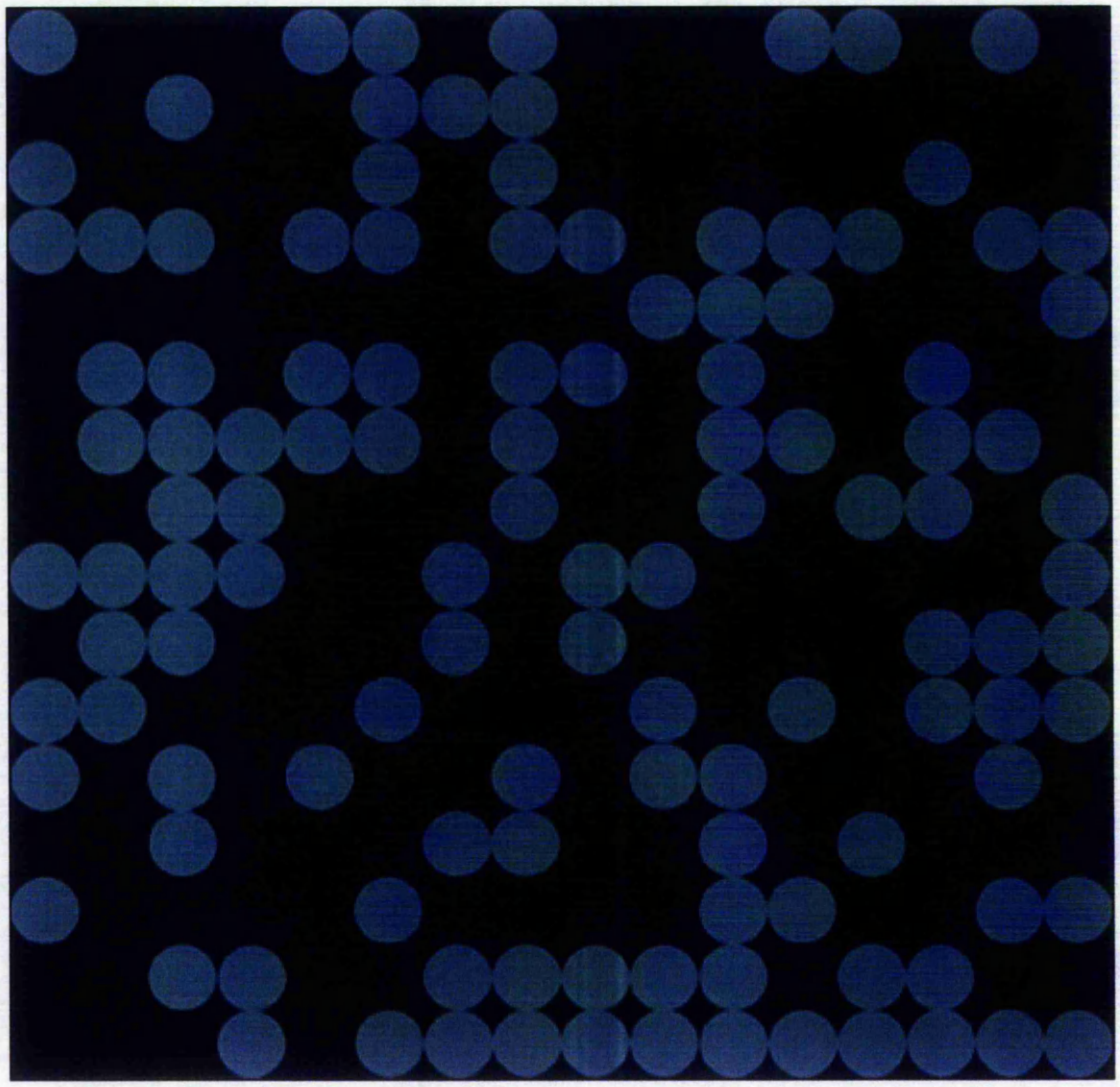

Figure 4-S: Single Motif On/Off

4.5.1.2 Basic Process 2

Many of the early design experiments were inspired by Albarn et al's (1974: 22) investigation into pattern and number. In particular, their use of Fibonacci series[5] to produce patterns inspired investigation. From their original Fibonacci sequences, they developed, by a rather complex method, short series of numbers which they then used to represent line lengths. The resultant patterns were constructed by drawing continuous straight lines of the lengths specified by the number series, with a 90° change of direction after each. Figure 4-T shows a reconstructed example of this technique. The pattern shown uses the number series 1, 2, 5, 4, 7, 8, 8, 7, 4, 5, 2, 1

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[5] A Fibonacci series of numbers is one in which the first and second numbers in the sequence are added together to give the third, which is in turn added to the second to give the third, for example: 0 1, 1, 2, 3, 5, 8....(Albarn et al 1974: 22)

with a series of anti-clockwise direction of changes after each line length. On the left, a single iteration of the sequence is shown. On the right, the third iteration is displayed.

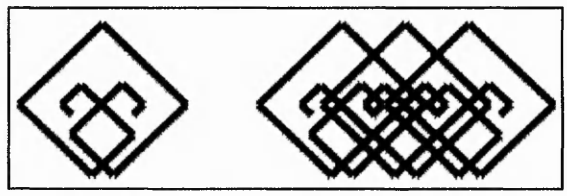

Figure 4-T: Reconstruction of Albarn et al's Fibonacci Pattern ....(Albarn et al 1974: 22)

This process experimented with similar techniques, using random numbers. A list of random numbers between two parameters is produced; see Figure 4-U for an example. A starting point is decided and a horizontal line drawn. Its length is equal to the first number of units in the list. Subsequent lines are drawn, each starting at the end point of the previous one, at 90° to it, in a clockwise direction, (Figure 4-V).

7	8	7	3	1	1	1	3
5	8	3	7	1	7	3	6
1	2	5	1	1	3	7	1
8	6	4	3	4	3	1	6
8	2	2	7	7	3	4	5
3	1	4	5	4	4	3	4
2	2	2	4	1	8	7	8
6	3	1	7	5	6	1	3
6	8	4	1	3	5	2	3
6	4	6	3	6	5	5	2
4	7	4	3	2	2	8	3
1	7	6	7	5	3	1	1
4	2	8	8	5	8	7	2
3	1	2	7	5	7	1	5
5	1	8	7	6	1	4	5
6	5	6	7	3	2	5	5
8	8	8	8	4	8	1	6
7	4	7	4	5	2	8	6
8	5	1	1	3	5	8	4
1	6	1	1	2	2	1	3
5	1	6	4	3	4	1	7
5	4	4	6	5	7	4	8
2	2	4	8	6	7	4	3
3	5	6	4	4	1	5	1
5	8	8	5	8	2	3	4
6	6	3	6	5	7	7	8
4	5	5	6	5	5	4	8
1	8	7	1	7	7	4	4
6	4	1	1	1	2	1	4
5	4	5	6	5	8	8	3
6	6	2	2	3	1	8	6
5	6	5	8	1	3	1	4
2	6	3	8	6	5	3	1
6	3	3	4	6	4	1	5
5	6	3	3	3	6	1	6
8	3	4	1	6	4	4	4
5	2	3	1	4	5	8	2
6	2	4	8	6	4	5	7
3	5	6	1	6	7	3	5

Figure 4-U: Random Number List to Give Unit Lengths on Line Rotation Example

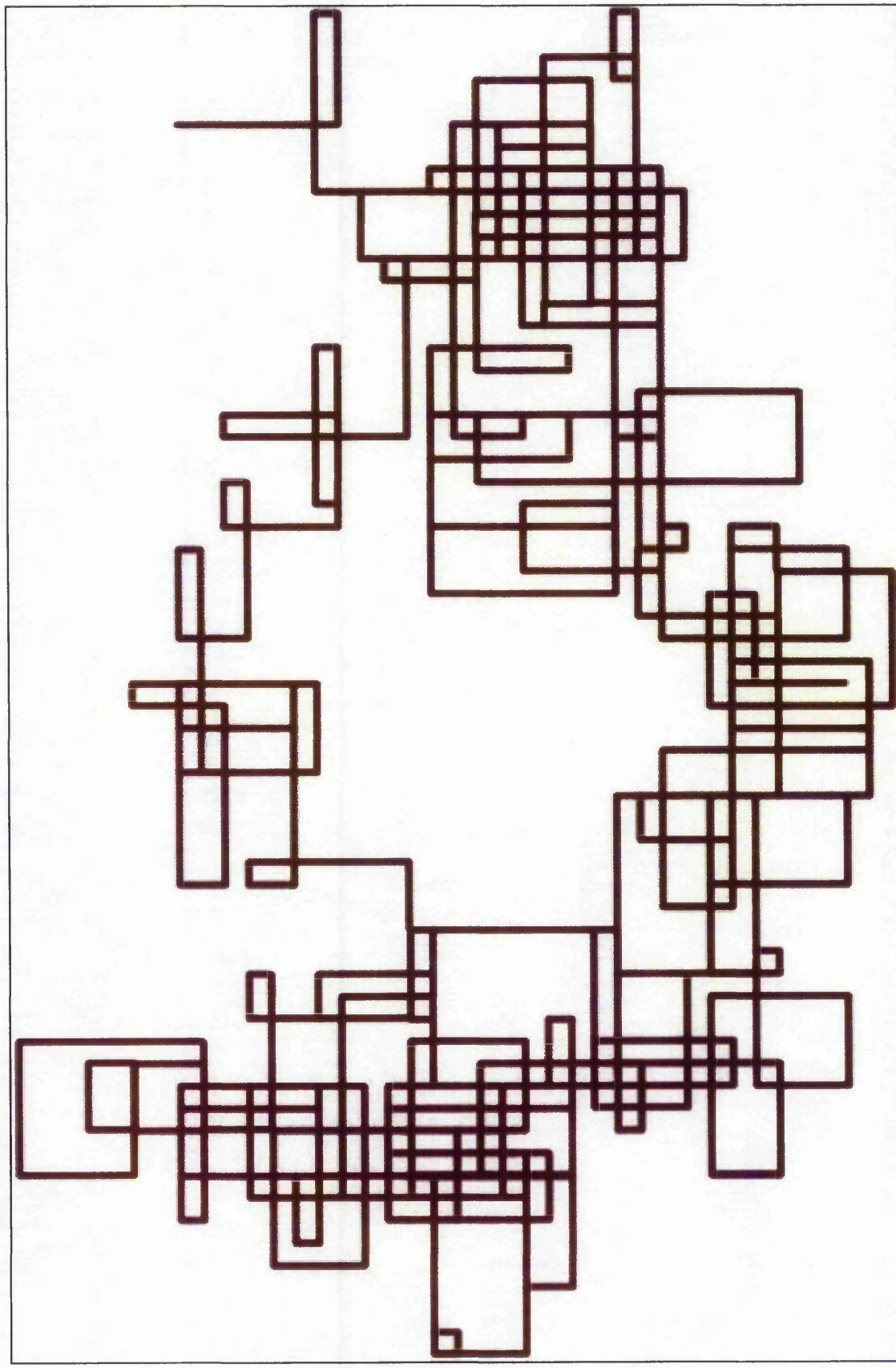

Figure 4-V: Example of Line Movement Pattern

4.5.1.2.1 Observations

Though this process produced interesting results, obvious problems were foreseen in continuing with the idea. Practical questions arise from this method of construction, for example: where should the line begin; what rule should be followed if the edge of the canvas is encountered; how could colour be incorporated into the pattern; and how should completion of the pattern be ascertained? Though this process makes even coverage of the canvas difficult to control, further experiments were investigated, some of the results of which can be seen in section 4.5.2.2.

4.5.2 Three Construction Methods

The two processes above demonstrate basic ways in which random numbers were utilised to produce design experiments. Three pattern types were identified into which all of the designs can fit. They are grid-based, progressive and co-ordinate based.

Grid-based designs are those in which a grid of random options is produced into which one or more motifs are manipulated. Basic process 1 obviously fits into this category. The grid could be a block, half-drop, or other structure used for repeating patterns, which guarantees a degree of uniformity in all but the basic on/off example. Consequently, grid-based designs are the most similar to traditional repeating textile pattern methods.

In progressive pattern types each transformation is dependent on the last, so usually a list of random transformations is used, rather than a grid. Basic process 2 can be seen as an example of this, in that the starting point of each line and the direction of the line are dependent on their predecessor.

Co-ordinate based designs use randomly chosen co-ordinates to determine the position of each motif. Other transformations may be applied, and multiple motifs could be used to produce this type of design. This type wasn't discussed as a basic process, partly because it was developed at a later stage, and partly because the construction should be fairly self-explanatory, after the explanations of the other two processes. Further examples of each design type are now discussed in detail.

4.5.2.1 Grid-Based Patterns

The commercial considerations highlighted above show non-repeating patterns would require some continuity across the canvas, but the previous discussion of pattern shows that it is variety which makes a pattern eye-catching. Grid-based patterns automatically display uniformity, and hence the experiments are designed to

investigate how that uniformity may be reduced. These experiments were developed in the same way that designers use formats other than the block repeat to alleviate the uniformity of a repeating design. By using a tessellating shape other than a rectangle, the eye is less drawn to the repeat. For example, a hexagonal, or honeycomb grid produces the effect of a half drop repeat. Even a rectangle or square in a half drop or brick format lessens the emphasis on structure.

Some early experiments with the grid-based construction method showed that motifs with linking points provided continuity, and prevented the grid structure being obvious. This observation led to a series of experiments with non-linking motifs based on a square grid structure to identify other features which may lessen the effect of the grid. For clarity, these experiments are discussed before examples which display linked motifs.

4.5.2.1.1 Non-Linked Experiments

In these experiments only non-linking motifs in various combinations of colour, style, and quantity were used on a square grid structure. The gendered pattern feature set was utilised to inspire a variety of different motifs, including geometric circles and squares, and organic leaves and flowers, together with more abstract shapes. All designs were based on a sixteen-unit by sixteen-unit square, with one motif occupying each unit. The experiments used the following combinations of motifs: one motif, present or absent, (shown in Basic Process 1, Figure 4-S); two motifs, always present, (Figure 4-W); six motifs, always present (Figure 4-X); and twelve motifs, always present (Figure 4-Y).

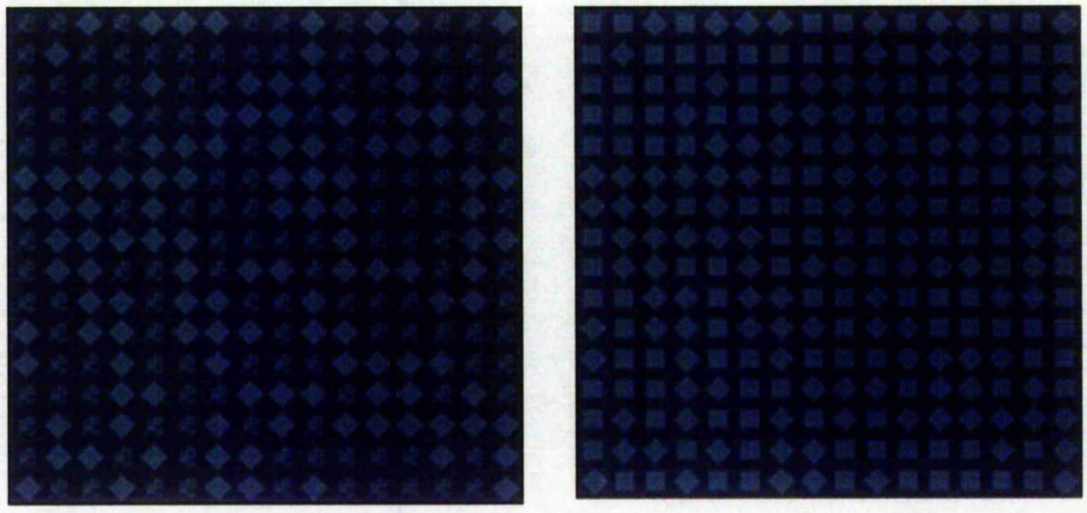

Figure 4-W: Two Non-Linking Motifs, Flower & Diamond (left), Square & Diamond (Right)

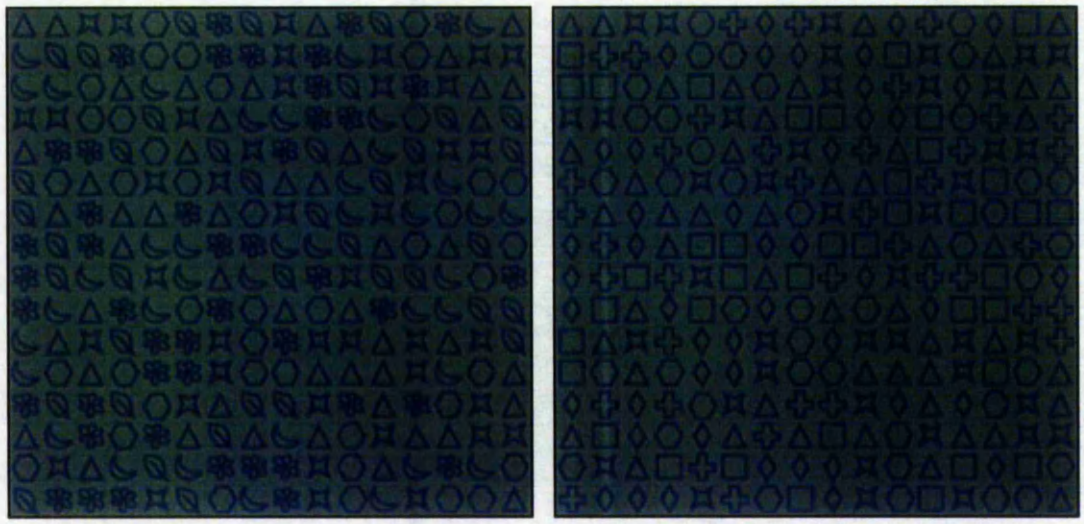

Figure 4-X: Six Motifs, Geometric & Organic Mix (left), All Geometric (Right)

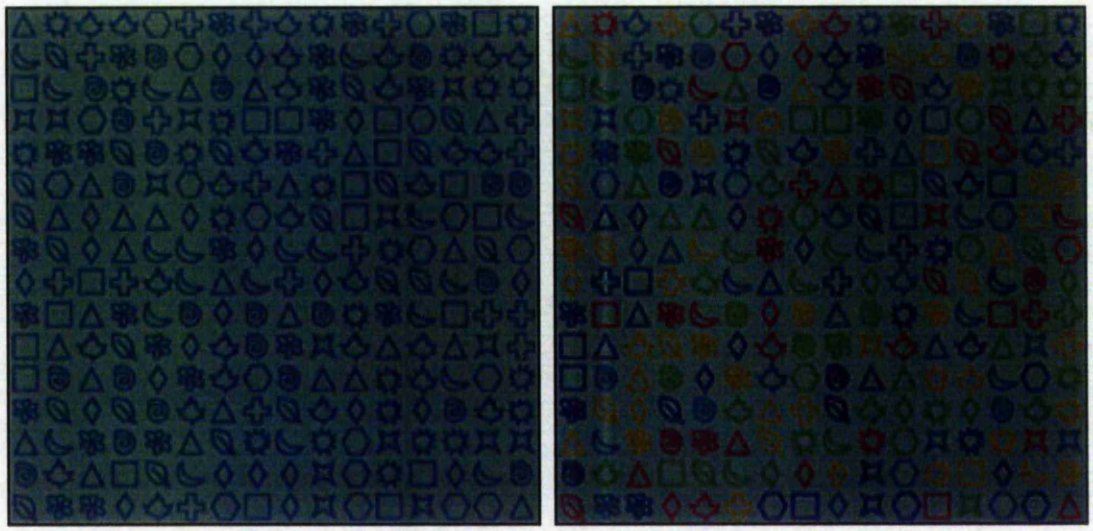

Figure 4-Y: Twelve Motifs, with colour variation on right

It was immediately apparent that all the experiments displayed too much of the regularity that I was seeking to reduce. This was almost certainly due to the square grid structure, which is quickly perceived by the eye. This effect is heightened by using motifs of a similar scale and by the formation of linear negative spaces between them which appear as a visual grid. The least uniform are the on/off designs in which the grid structure is masked by the appearance of larger irregular shapes caused by several motifs in close proximity to each other (see Figure 4-S). This is also evident in Figure 4-W, where, with only two motifs, larger shapes of similar motifs are combined to give irregular shapes. However, though the unwelcome grid structure is slightly concealed, the irregular shapes give little feeling of cohesion. Most of these examples are shown in two colours, as colour also allows the eye to form other patterns. Where

the design motifs were of similar hues and intensities, the design appeared more uniform. If one colour particularly stood out, the perception of shapes of that colour is highlighted; hence the shapes, rather than the grid structure stand out, as with the on/off designs.

Contrary to initial expectations, a larger number of different motifs did not lead to a less regular appearance; in fact the opposite may be true, as there is less opportunity to pick out blocks of the same motif. Similarly, the use of very different motif types, organic and geometric, caused no particular disjunction in most cases. This was taken to an extreme in Figure 4-Y, where all six organic and all six geometric motifs are combined. Clearly, square or rectangular grids are easily perceivable to the eye, even when they are only visible in the form of the negative spaces between the motifs.

The general conclusion reached from these design experiments was that non-linking square grid-based designs gave results that were too uniform, and too similar to their repeating counterparts to be of particular interest to this research. I was looking for a combination of visual interest produced by random variations, together with a continuity which would provide a commercially viable fabric design. In the next experiments, linked motifs are used in a further attempt to achieve this balance.

4.5.2.1.2 Linked Motifs

In these experiments, three different motifs were created to fit into a unit square. Each was given different linking points, either at the corners of the square, or the midpoints of its sides. Random number grids of the correct dimensions to fit the canvas were generated containing one of the numbers 1, 2 or 3 in each square. The motifs, similarly identified as 1, 2 or 3, were placed according.

The first experiment, shown in Figure 4-Z uses three motifs displaying mirror symmetry through two axes, as shown in Figure 4-AA. The linking points give some cohesion, but the variations in colour allow the individual motifs to be identified[6]. If this were removed a more cohesive, overall feel may be given to the design. The limited number of motifs gives areas which appear very repetitive. The square grid structure is clearly visible. Areas in which the third motif is repeated several times in a vertical column, for example towards the top of one of the central columns in the example, are particularly visually obvious, and give me the impression of a spring. Their obviousness gives the

[6] Please note that the printing process has given two of the three motifs an extremely similar colour, a more representative example may be found on the CD accompanying this thesis.

impression that this motif has many more occurrences than the other two, though in fact this not the case. It is likely that this is the result of the motif being constructed of two identical elements, one on top of the other, which the other two are not. Also, the first motif contains a vertical element which does not link to the other elements in the motif. Its uprightness and lack of linking make it stand out visually. It may even be that through its irregular appearance, the other two motifs appear more repetitive in the areas where the first motif is absent.

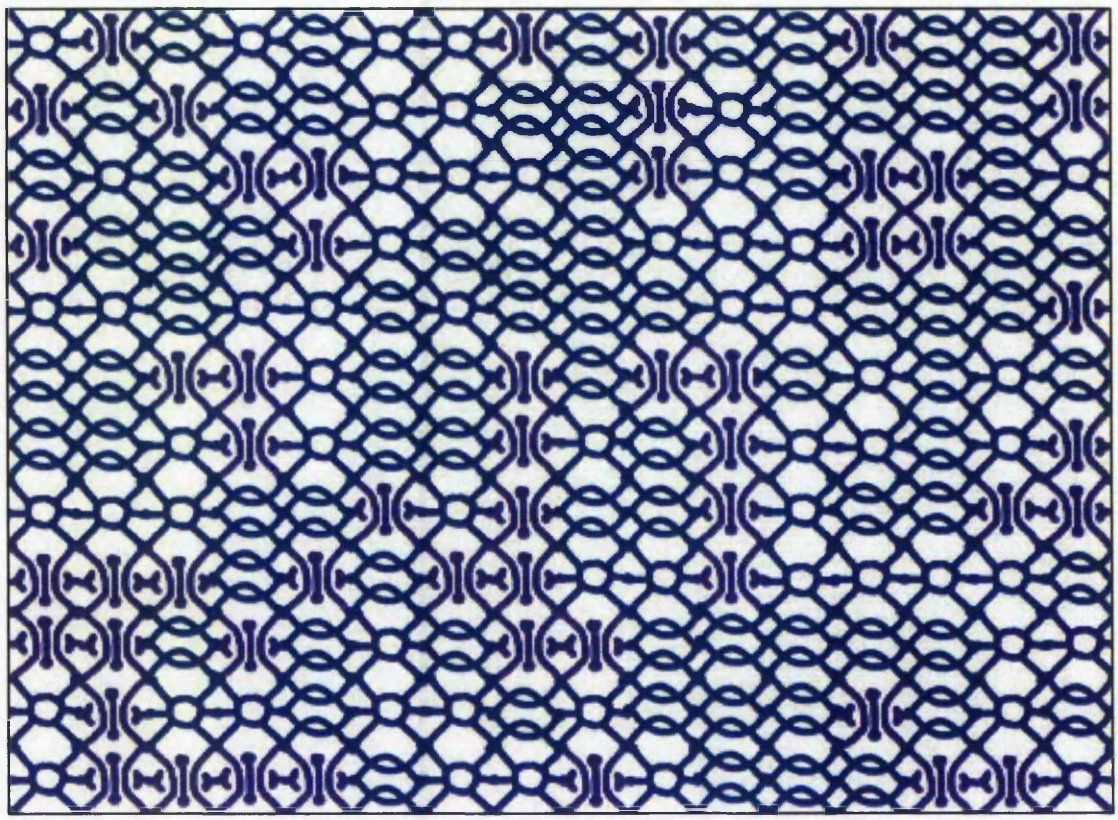

Figure 4-Z: Three Symmetric Motifs with Linking Points

Figure 4-AA: Three Symmetric Motif Units

In Figure 4-BB, the same three motifs are used with an extra random on/off parameter, which when switched on, rotates the motif through 90°. This added variation gives more cohesion rather than less, as the areas in which the same motif is repeated become smaller and less obvious. The 'spring-like' effect of the third motif is reduced by the rotation, though there are still areas where it is prominent. Also, the first motif with its unlinked upright is now displayed either vertically or horizontally,

which lessens the desire to visually identify it in isolation to the other motifs.

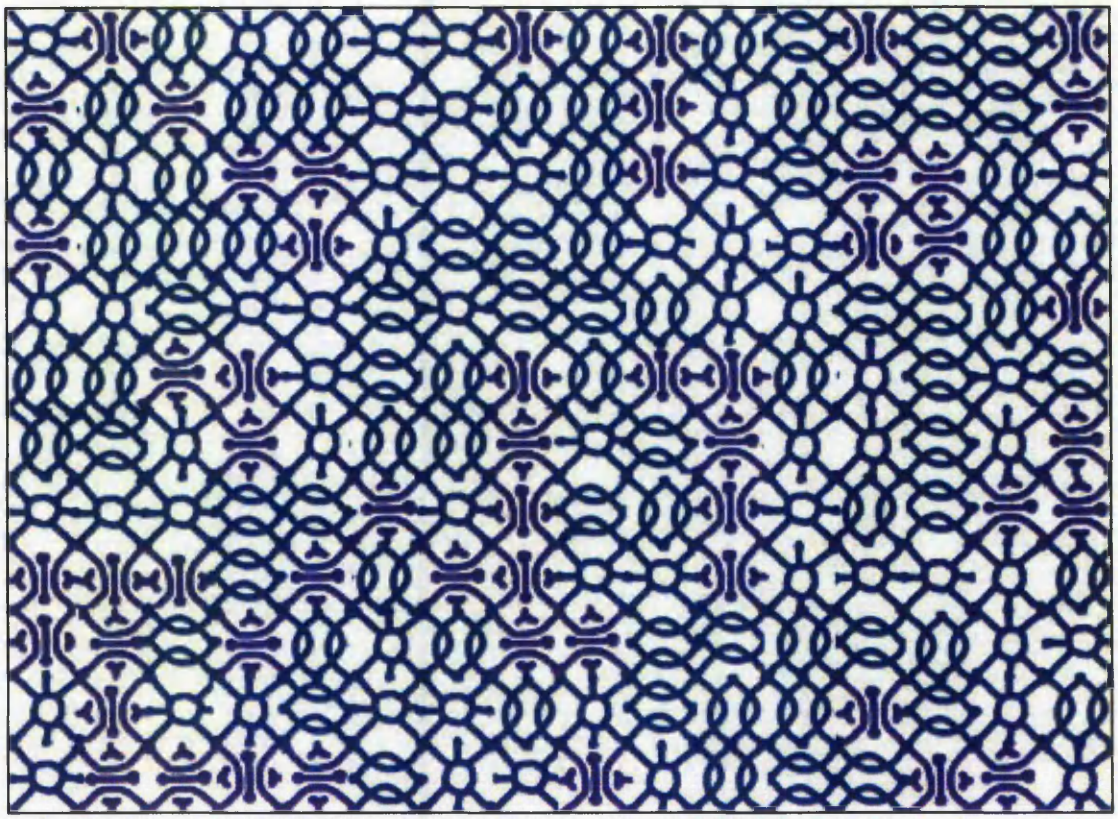

Figure 4-BB: Three symmetric motifs with rotation

As the previous example demonstrated, the square grid structure is difficult to camouflage. In the next experiments, the effect of using less symmetrical motifs is considered. Figure 4-CC shows one example which is constructed from the three motifs illustrated in Figure 4-DD. Here, only the first motif has rotational symmetry, and none has reflective symmetry. The success of these less symmetrical motifs in concealing the grid is partial. The semicircles and crosses from the second motif form are visually linked by one's eye to form the horizontal and vertical lines of a grid. While this is not as obvious as the symmetrical examples, a further diagonal structure is apparent here. As the unlinked upright of the first motif in the previous example formed a prominent feature, here, the unlinked diagonal element of the third motif encourages the eye to construct diagonal lines over the image. The other unlinked element, the filled semicircle, appears in the second and third motifs in different orientations, which lessens its prominence to the eye, while the 'hand-drawn' appearance of the motifs in Figure 4-Z give an organic quality. The three motifs shown in Figure 4-DD have combined hand-drawn and geometric qualities. The flat edge of the unlinked semicircles adds precise horizontal and vertical elements, while the unlinked diagonal also shows geometric precision. The curved elements and imprecise linking within the

design provide the 'hand-drawn' effect.

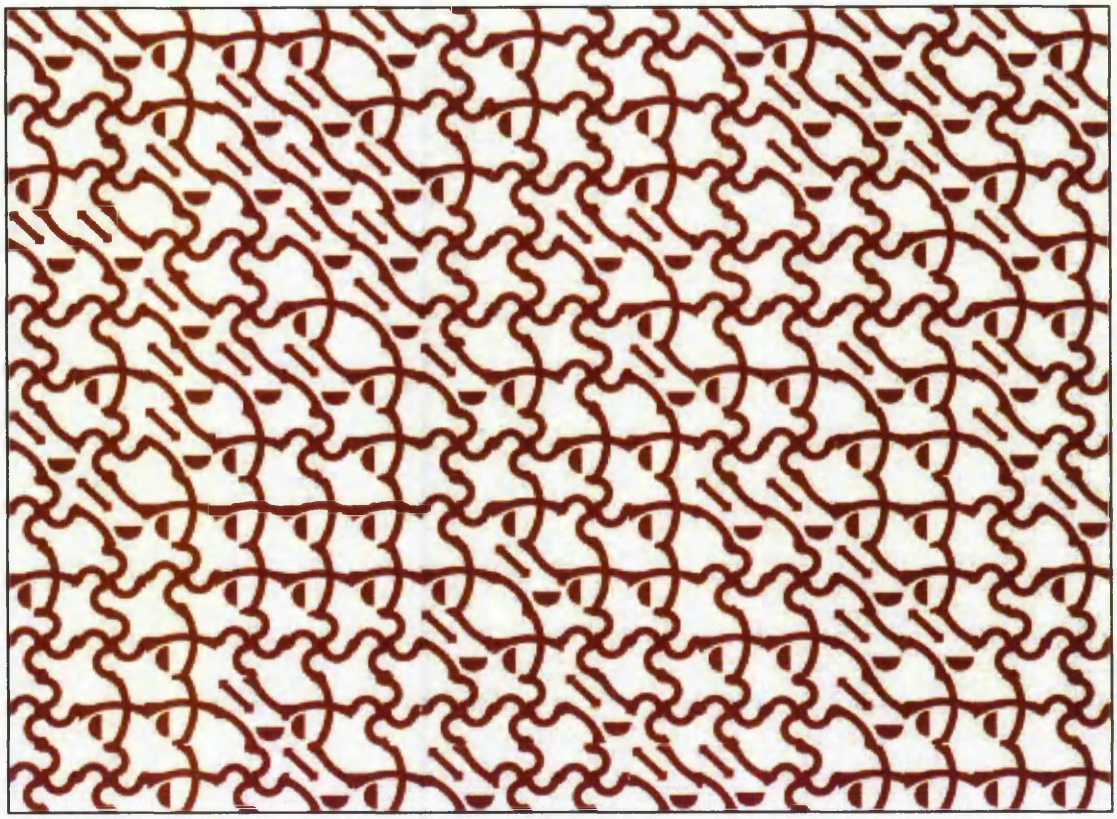

Figure 4-CC: Three Linking Motifs

Figure 4-DD: Three Motif Units

Further variation is illustrated in Figure 4-EE, where the same three motifs are incorporated with a random on/off parameter which dictates that the chosen motif be subjected to the added transformation of a vertical reflection, in other words, some of the motifs appear in their mirror image, for extra variation. While this variation once again lessens the visibility of the grid structure, and the linked motifs give some form of continuity, the example gives me a feeling of disjuncture and unease rather than cohesion. The combination of linked and unlinked elements to the motifs, together with the mixture of geometric and hand-drawn qualities may well account for this tension. I find my eyes battling to find patterns within the image, often leading me into a series of quick jerky eye movements as I scan the area. In doing this I am reminded of the earlier discussion of pattern in section 4.2, in which intricate or over-elaborate patterns were cited as possible causes of confusion.

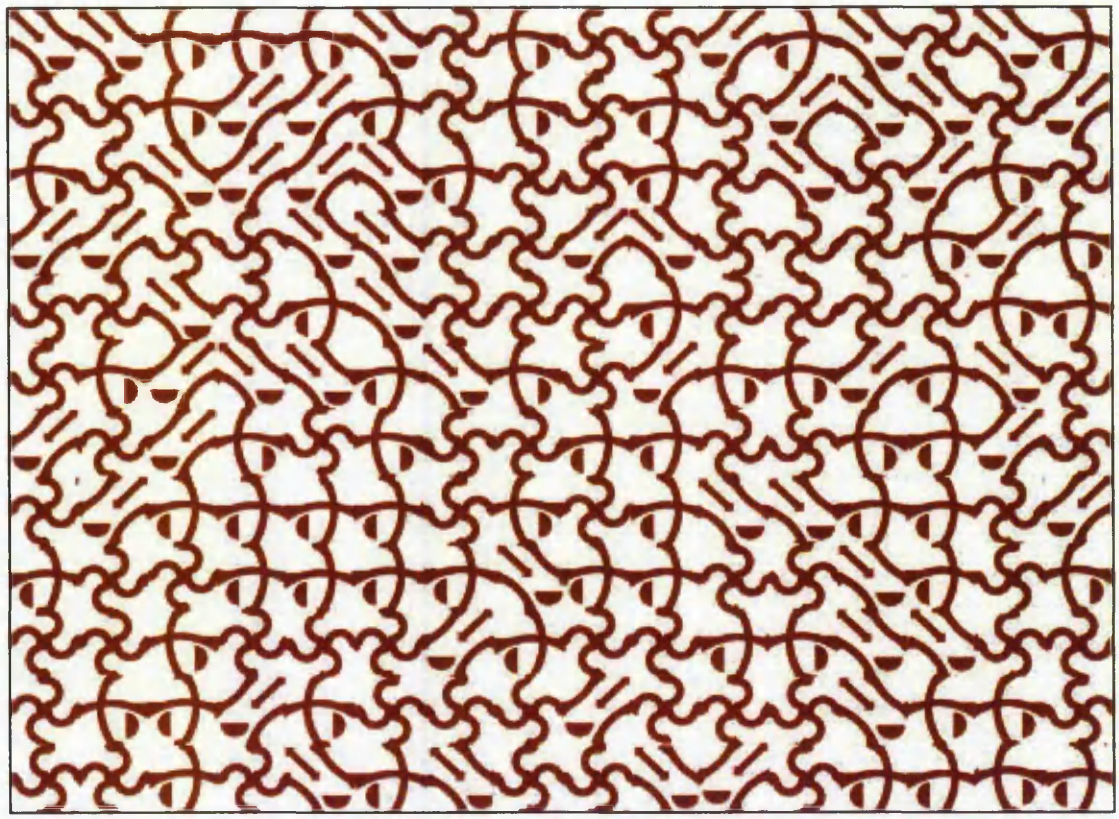

Figure 4-EE: Three Motifs with Reflections

4.5.2.1.3 Hexagonal Grid Experiment

Another possible method identified as lessening the grid structure in grid-based patterns was the use of a tessellating shape other than a square or rectangle. In this experiment, illustrated in Figure 4-FF, a single motif was drawn to fit into a hexagonal unit, with linking points at each of the vertices (see Figure 4-GG). A honeycomb grid was generated, each cell of which contained a random number from one to six. This grid, and its corresponding numbers were then translated into a design example in which each cell of the honeycomb was filled with motif, rotated through 0°, 60°, 120°, 180°, 240°, or 300° according to its numeric equivalent.

The use of the hexagonal grid removes the feeling of organised structure from the example. The single motif, in its six rotations rarely forms easily identifiable clusters, as have been seen in previous examples. The overall feel of the pattern is one of organic cohesion. This is enhanced by the use of a stylised organic form for the motif, together with the 'hand-drawn' quality, identified in some of the previous examples. Another contributory factor is quite possibly the fact that each vertex of the motif cell contains a motif linking point. This leads to all the negative spaces in the pattern being of similar size and shape, and adds to the cohesion.

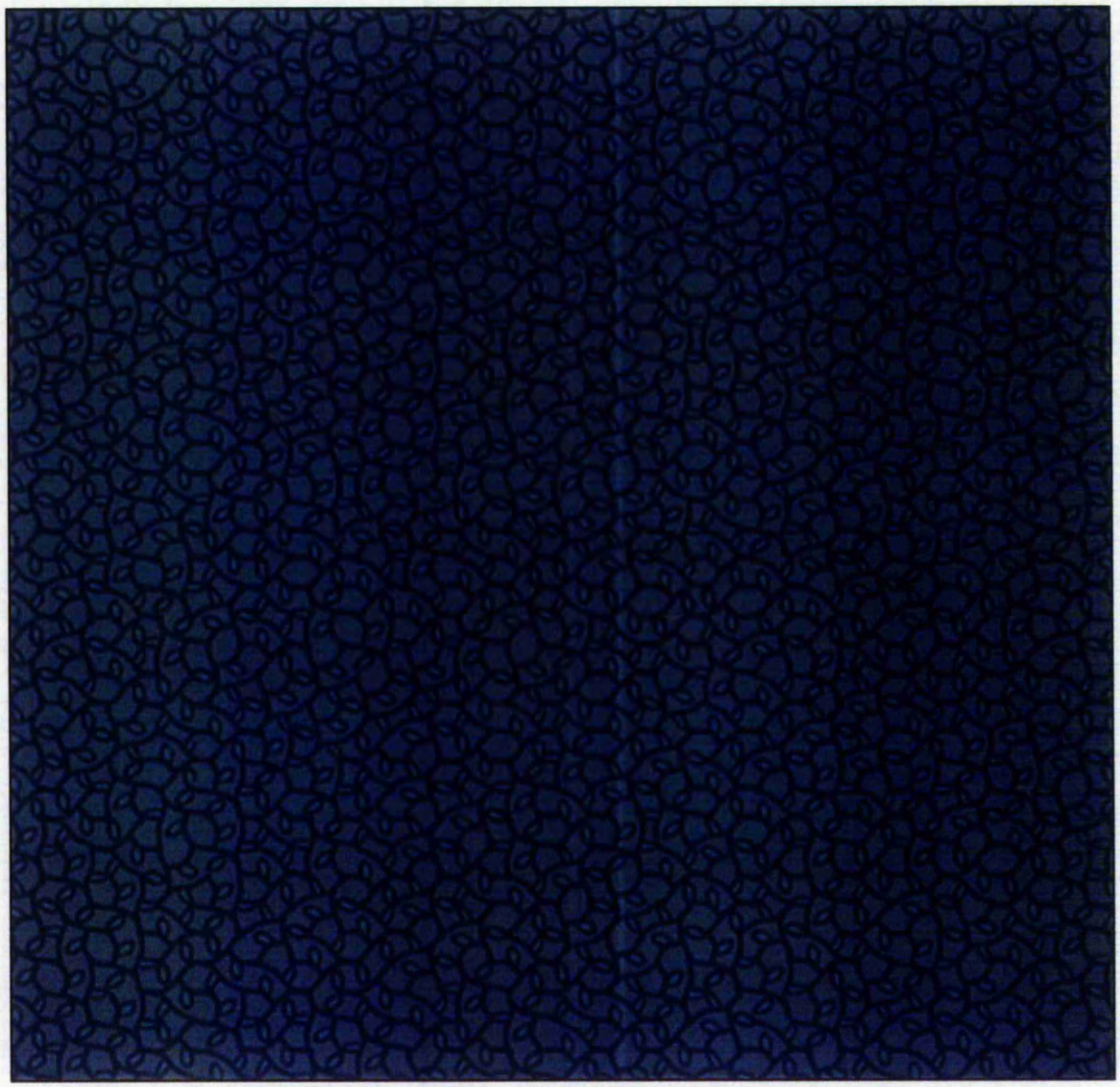

Figure 4-FF: Single motif Rotated on a Hexagonal Grid

Figure 4-GG: Motif for Hexagonal Grid Example

To further demonstrate the qualities of visual interest and cohesion demonstrated in this example, the left-hand side of Figure 4-HH shows a mock-up of a blouse printed with this pattern, while the right-hand side shows the same blouse as it would appear if printed with the same single motif without the random rotations. On the honeycomb grid, this appears as a traditional half-drop repeat. The randomly flowing features of the left-hand image make for interesting comparison with the obvious, scalloped or fish-scale structure on the right.

Figure 4-HH: Mock up of hexagonal pattern (left), compare with half-drop repeat (right)

4.5.2.2 Progressive

Basic Process 1 illustrated the first inspiration for this construction method, in which each motif is dependent in some way on the previously drawn one. Following that initial experiment, Albarn et al's method was explored further. They had showed that by reversing a numerical sequence, patterns were produced with different types of symmetry (Albarn et al 1974: 22). Rather than a Fibonacci inspired sequence, the number series shown below in Figure 4-II, were randomly generated, then reversed. The central number acts as a pivot and is not reversed. In Figure 4-JJ these number sequences are used to produce five patterns in which the direction changes from clockwise to counter clockwise after the pivotal element of the series. These patterns all display rotational symmetry. Figure 4-KK shows five different patterns produced from the same number sequences, without the reversal of the direction after the central pivot. In this case the patterns display mirror symmetry through one axis.

1.	7	6	7	7	3	4	9	8	6	1	6	8	9	4	3	7	7	6	7
2.	4	1	9	1	7	3	9	8	5	1	5	8	9	3	7	1	9	1	4
3.	1	4	8	5	3	9	3	1	6	1	6	1	3	9	3	5	8	4	1
4.	9	1	4	4	2	5	2	4	8	4	8	4	2	5	2	4	4	1	9
5.	7	2	2	5	1	9	4	7	5	5	5	7	4	9	1	5	2	2	7

Figure 4-II: Table to show Random Number Sequences for Linear Patterns

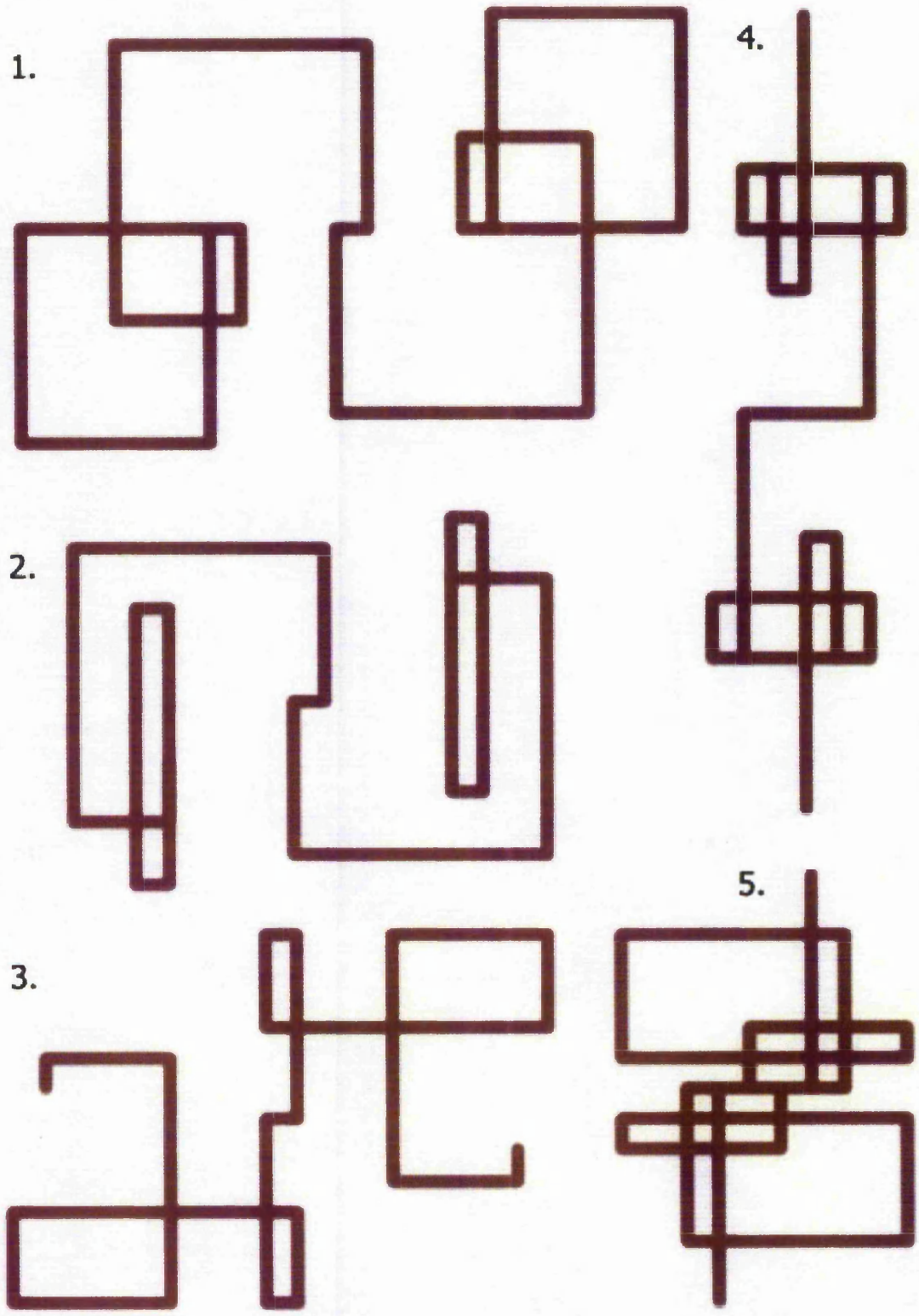

Figure 4-JJ: Albarn et al inspired motifs with inverted mirror symmetry

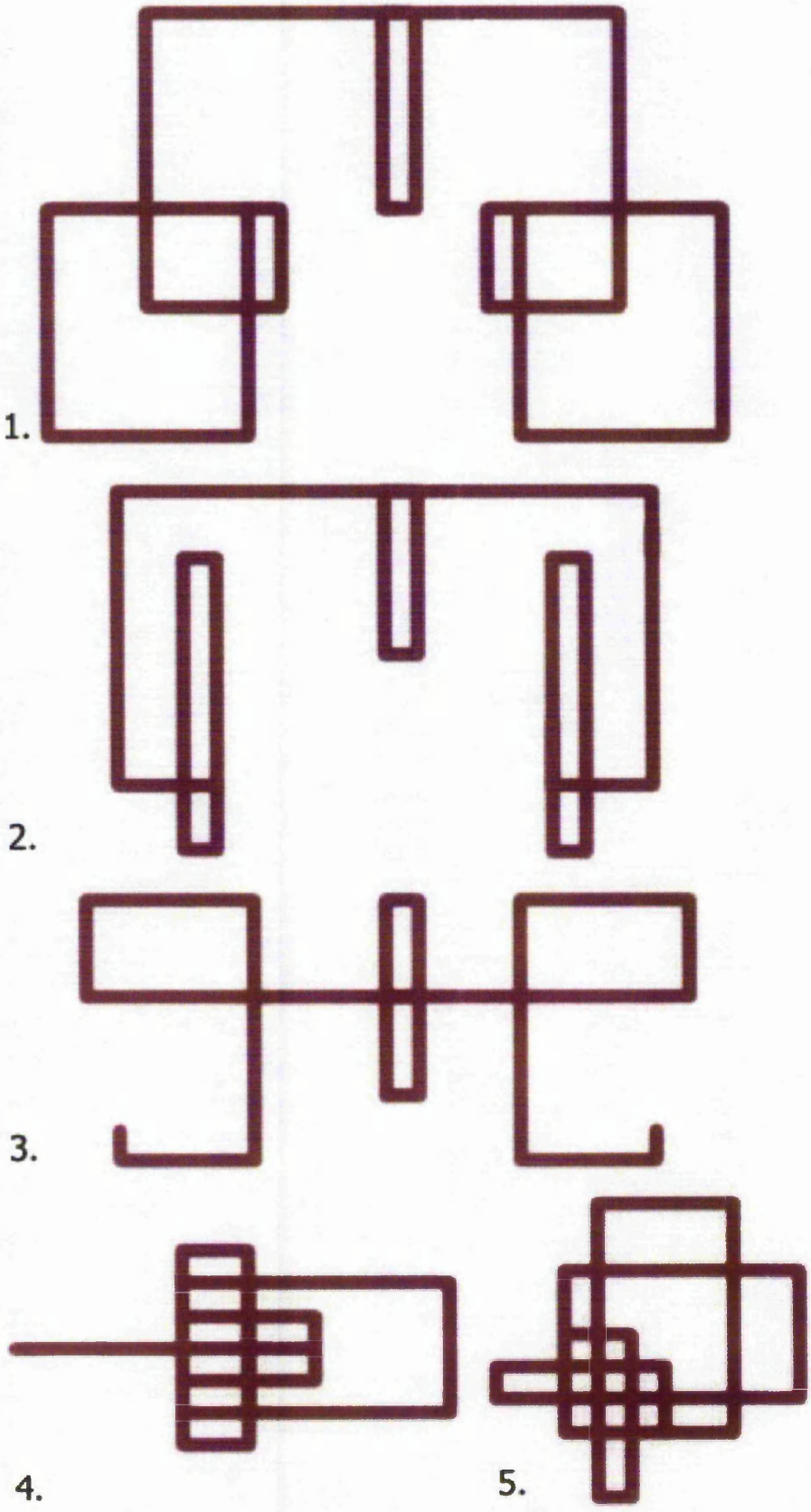

Figure 4-KK: Albarn et al inspired patterns with mirror symmetry

As previously discussed, and demonstrated in Basic Process 1, (see section 4.5.1.1), filling the surface area with lines of random length is difficult to control in terms of the evenness of the spread across the canvas. These experiments produced small autonomous patterns, rather than randomly moving lines. A different method was considered for filling the canvas surface: these autonomous randomly produced patterns could be used as motifs to fill a repeating structure. Figure 4-LL shows a pattern of this type. The fifth rotationally symmetrical motif illustrated in Figure 4-JJ is used as a repeating motif, the pattern has a one-third drop structure and the linking branches of the motif were reduced in length by one unit to increase their proximity to each other. While this experiment produced some interesting examples, such as the one below, it was felt that this was a diversion away from the main thrust of the design experiments, which places the emphasis on using non-repeating motifs for pattern production.

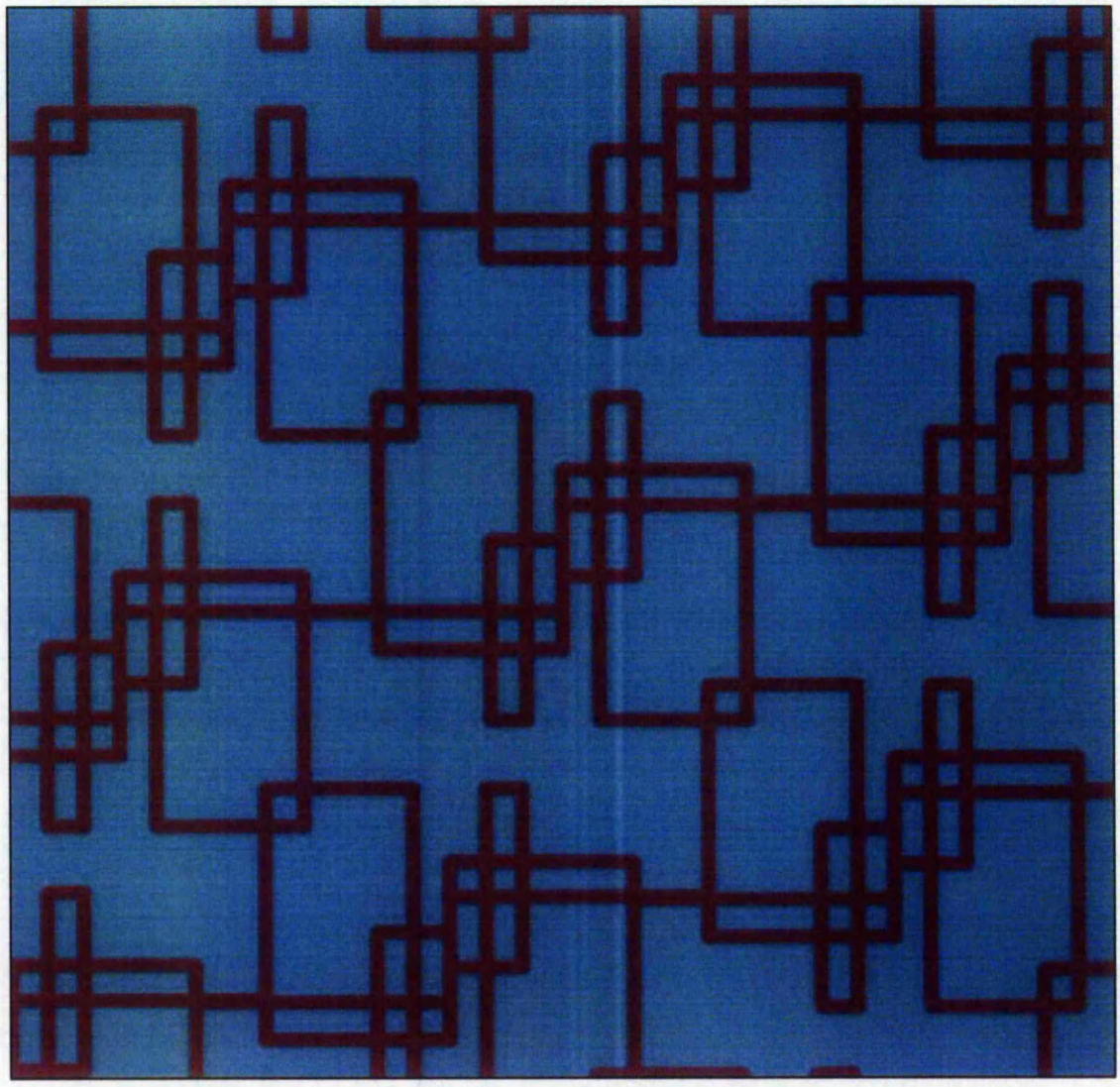

Figure 4-LL: Repeating Pattern based on Randomly Constructed Linear Motif

Experiments which were pursued with the progressive construction method are recognisable by their 'striped' appearance. The motif repeats across the top of the design, and is then manipulated by stretching, squashing, or repositioning. Unlike the grid-based designs, each manipulation is dependent on the previous one, i.e. rather than taking the basic motif each time; the previously manipulated motif above has the manipulation applied to it in order to produce the next motif in the column. This technique allows progressive design examples to retain some uniformity across the canvas, which was lacking in the first progressive experiments, while not displaying the rigidity of the grid-based examples.

The first example in Figure 4-MM shows linear motifs which begin vertically but are allowed to meander by taking angles of 45 degrees to the left or right. Each vertical movement is one centimetre in length and can either be diagonally left, diagonally right or vertically down, as selected by a random function. To prevent the lines crossing or meandering off the page, each is restricted to stay with a two centimetre vertical band (one centimetre to each side of its original starting point). This effectively means that after two diagonal steps down in the same direction, the restricting parameter prevents another diagonal step in the same direction; only vertically down and diagonally in the opposite direction are allowed. As each starting point is one centimetre apart, this allows the lines to touch but not cross. In this example, each line is subjected to a 10°change in hue and several *PhotoShop* filters have been applied to the result to give interest.

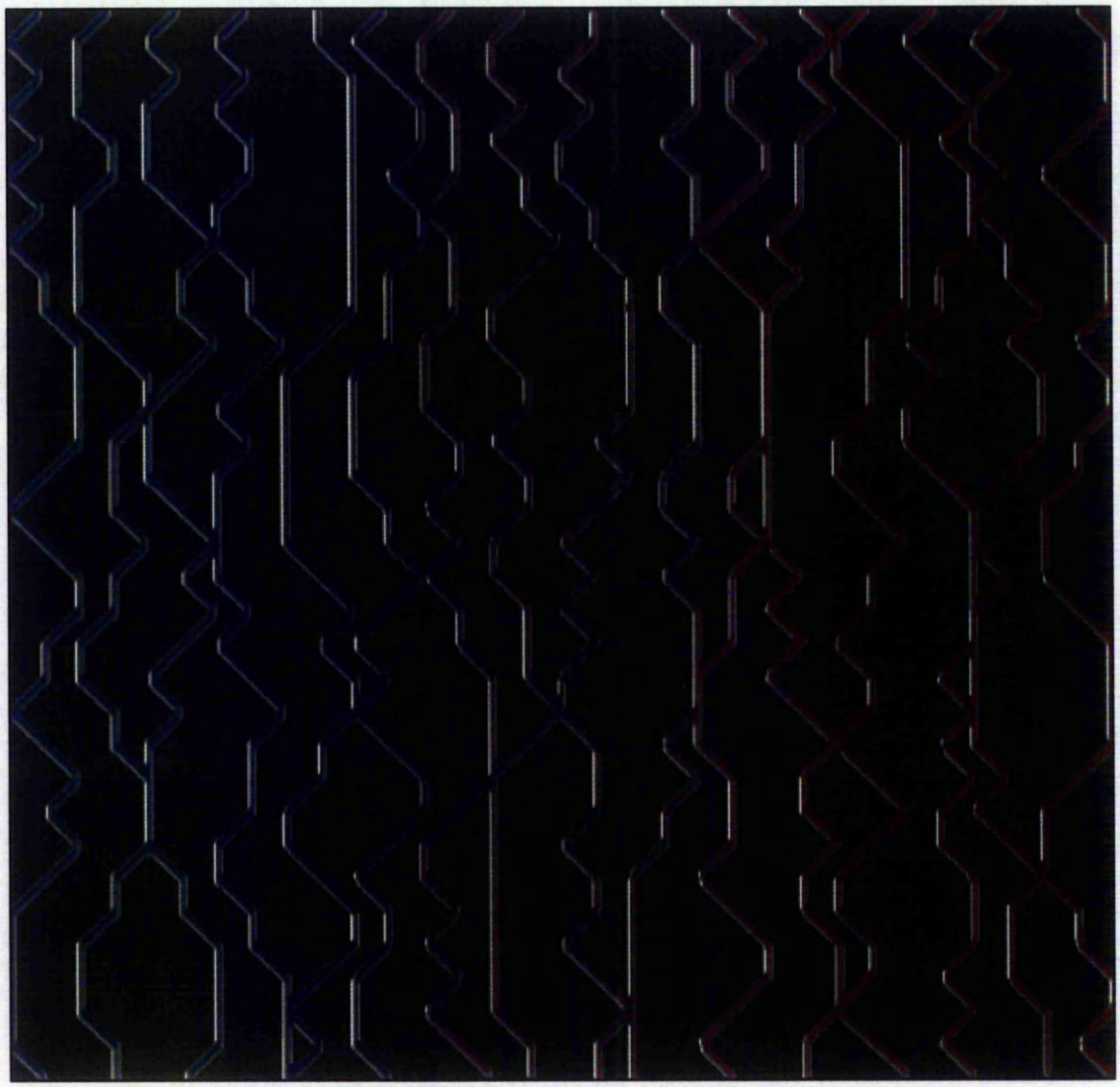

Figure 4-MM: Progressive Vertical Line Movement

Figure 4-NN shows another progressive design in which circular motifs are stretched or squashed into ellipses. In this design the progression is not just that the subsequent motif relies on the position of the previous one, but also that the subsequent shape of the motif relies on its predecessor. The four possibilities for each motif as it progresses down the column are: stretch by 20%, squash by 20%, stay the same shape but change hue by +10°, or stay the same shape but change hue by -10°. In most cases, the amount of stretching and squashing evens itself out without presenting problems, but the bottom of column two shows the degradation effected by a number of contiguous squashes. While this may provide a point of interest in an individual art work, it does highlight the need for restricting parameters should this technique be applied to commercial textile design.

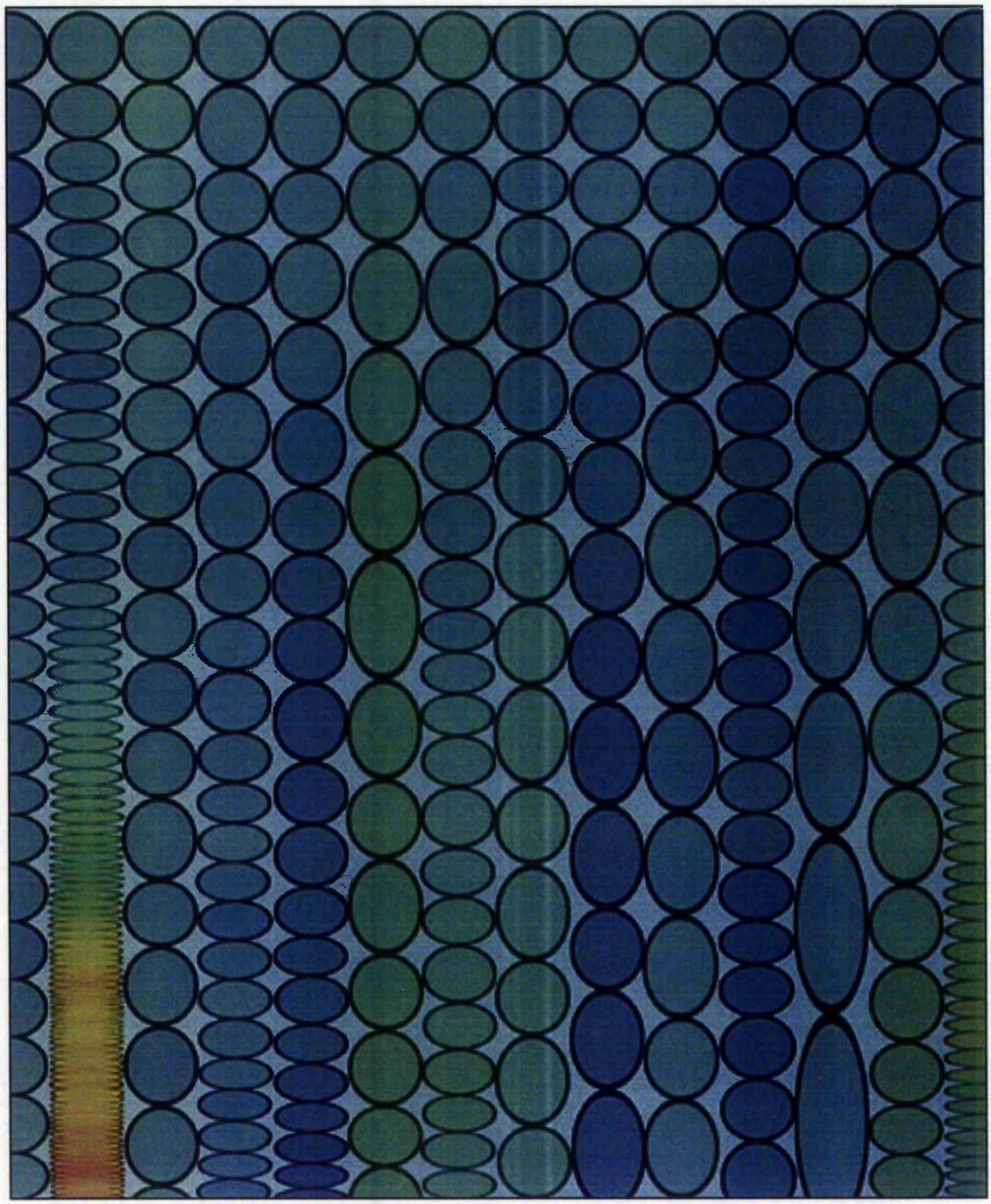

Figure 4-NN: Progressive Columnar Ellipses, showing degradation in column 2

The lack of restricting parameters is most evident in one of the early experiments in the progressive series, shown in Figure 4-OO. This experiment used randomly selected semicircular and quarter circular arcs which were presented down the page in columns. To maintain continuity and linkage the following motif must be placed with its uppermost point at the same coordinate as its predecessor. However, the larger quarter circles function to move the column diagonally left or right, and there are no restricting parameters to block its movement across the page. Consequently, the

experiment fails in that there is no sense of continuity, there are large areas of background with no foreground motifs, and there are some areas in which the curved lines become entangled to such an extent that their original function as striped motifs is lost.

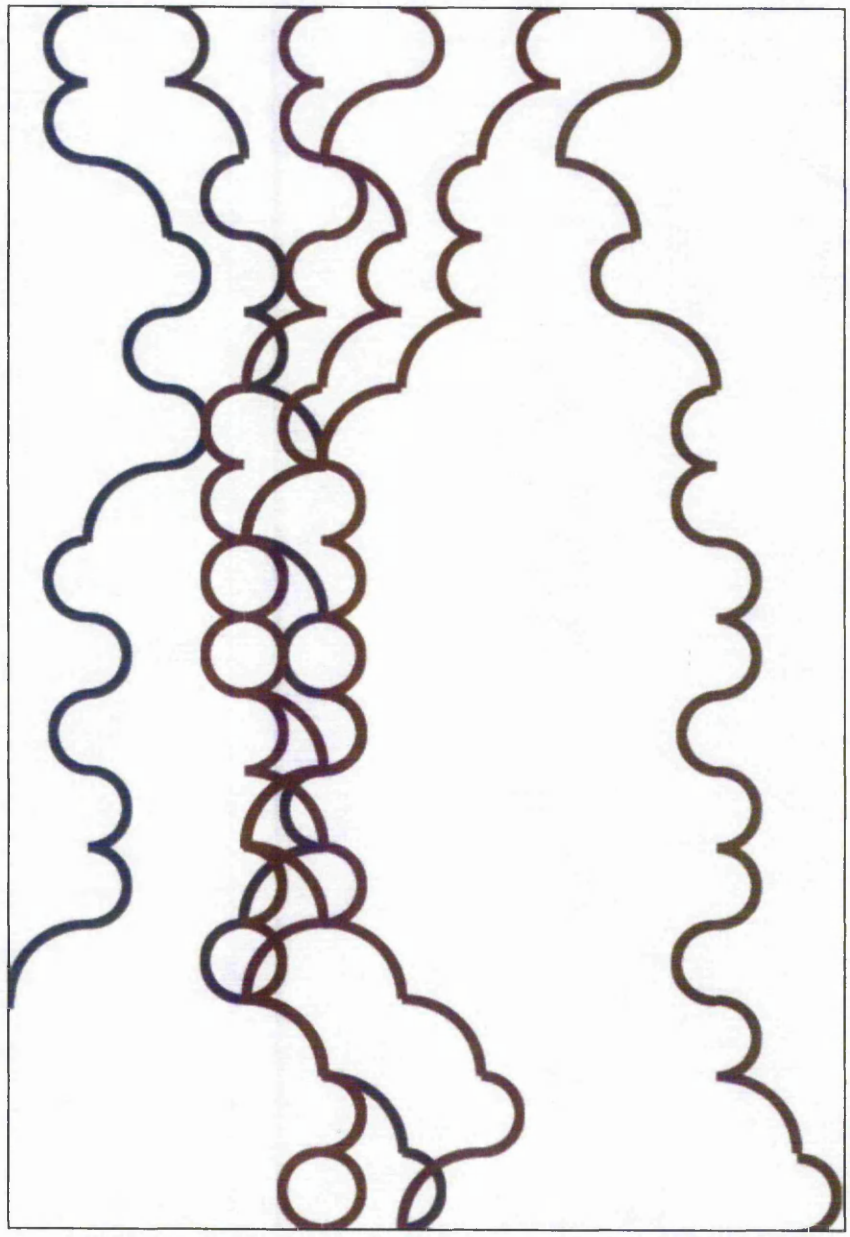

Figure 4-OO: Progressive Semicircles without sufficient restraint

4.5.2.3 Co-ordinate Positioning

The third type of design example eliminates the inherent structure of the previous types by randomly positioning the design elements. Each motif is designated co-ordinates within the frame of the design space. The co-ordinates are randomly decided. Restricting parameters are used to prevent the motifs appearing outside of

the design space. Further parameters are used to limit the number of motifs within the design space. The advantage of this method should be that no base grid can be located by the eye; however, the smaller dots on the examples in Figure 4-PP can be seen to be clustering in vertical and horizontal bars. This is a function of the manual technique used in which only integer values were used for coordinates, which were then translated into centimetres. In a fully automated procedure this restriction would not occur. The other disadvantages of this technique are the possibility of large empty areas, or heavily over-populated areas. Comparing the left and right hand images in Figure 4-PP shows how these problems might begin to occur. Large empty areas are less likely to occur as the size of the frame and number of motifs increase. Heavy over-population could be controlled with extra restricting parameters preventing a motif appearing in the same space as an existing one.

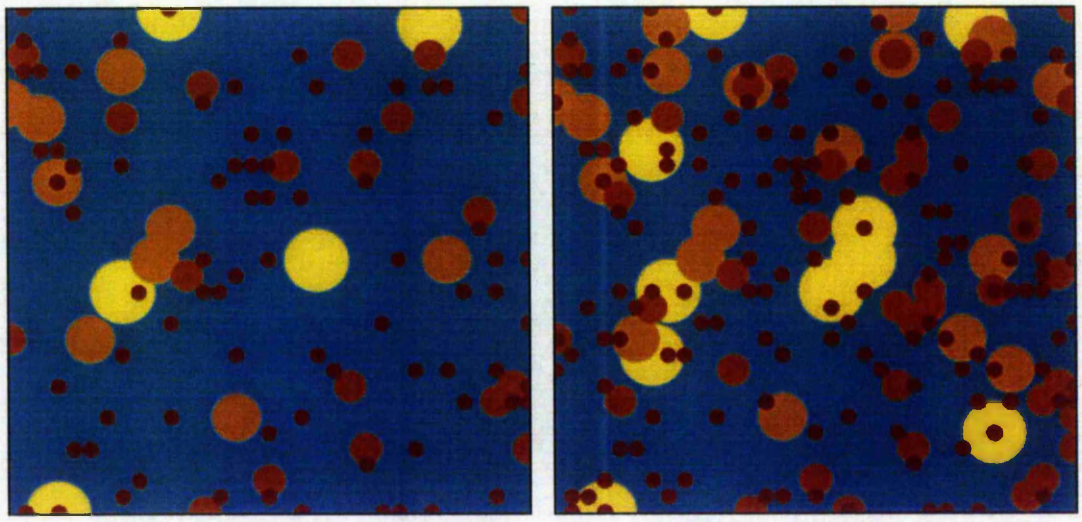

Figure 4-PP: Coordinate circles showing sparse (left) and dense (right) population

4.6 The Formulation of Cohesion Conventions

The commercial considerations and design experiments documented above have highlighted a set of requirements and desirable features which can be adopted in the next stage of the design work. Cohesion and continuity within the patterns has been an ongoing theme. The theoretical and analytical considerations which inform and inspire the design work lend themselves towards a proposal for cohesion through the desire to democratise or balance polarities by re-evaluating them as continua and amalgamating the gendered pattern features in such a way as to avoid stereotypical hierarchical connotations. Without some form of cohesion, the design examples would have a tendency towards the extremes of the continua, as Figure 4-OO shows.

Commercially, a major consideration is to avoid wastage through pattern cutting, hence patterns which have 'all over' qualities are desirable. Having established three construction methods for non-repeating patterns, the criteria for each to meet these requirements can be considered separately. For progressive designs, parameters are required to prevent degradation, which would cause specific areas of the fabric to look very different to the rest. For co-ordinate based designs, parameters are required which will ensure a fairly even spread of motifs over the surface of the fabric. Grid-based patterns, except those in which a motif may be present or absent, inherently avoid the problem of a lack of continuity. However, if a very obvious grid structure appears in the pattern, it may also limit the cutting options for pattern pieces, hence, for grid-based patterns, cohesion through linking elements and grid structures based on units other than a square or rectangle is required. For all the construction methods, the cohesive feel of the design is enhanced by the use of smaller motifs.

4.7 Summary

This chapter provides the conduit between the theoretical discourse and analysis of existing pattern on clothing and the practical work which leads towards the development of the design strategy in the final chapter. The diverse discussions of pattern and randomness provided by investigating randomness and its uses in both scientific and artistic imagery have assisted in locating the design work in terms of identifying the various contributory factors involved in its production. As was discussed in section 4.4 the design strategy is being developed and motivated by three major concerns: the theoretical aspirations, the aesthetic aspirations and the commercial considerations. While the first two of these motivations are personal to the project and driven by my own investigative desires, the third is equally important in terms of the construction of a satisfactory new design strategy for textiles.

The gendered pattern set has provided useful reference points within the discussion of this chapter. Regularity is paramount within any discussion of pattern, and tension between order and chaos is apparent within the non-linear systems chaos theory seeks to address. Similarly, the organic to geometric continuum is addressed, having roots as it does, in the cultural natural/constructed polarity. Scientifically, chaos theory has shown how order and chaos are necessarily intertwined in nature and produce natural patterns in all life forms whose beauty is inextricably linked to the environmental factors that caused its distortion during the growth period. By looking at artists who utilise computers and randomisation techniques in their work, I have demonstrated

that one of their major concerns is to offset or distort the perfect order a computer may produce, in much the same way as natural life is offset by its environment. Also, in a comparison with the genome in nature, the software used by the artists has in-built parameters controlling the development of the image. Similarly, while investigating the commercial considerations of non-repeating patterns for textiles I have highlighted a late twentieth century move away from the perfection desired in the times when to achieve it required much greater time and skill. Perhaps it is becoming one of the overriding themes of the early twenty-first century to move away from the technical precision now presented to us through the profusion of contemporary technology for the production and viewing of images.

The discussion in this chapter, together with the manual experiments into the production of non-repeating designs, have provided two further elements which can be added to the gendered pattern set and used to aid the development of the design strategy. A set of three construction methods has been identified and named as grid-based, progressive and co-ordinate based, all of which give different visual qualities. Cohesion conventions have been formulated which provide the criteria necessary for aesthetically and commercially successful non-repeating pattern creation, based on the discussion and experiments performed within this stage of the research.

These design experiments all required manual intervention which was elaborate and time-consuming to conduct. In many cases similar results may have been produced more quickly by traditional methods of hand-painting or cutting and pasting the motifs. However, by concentrating on the gendered pattern set, and developing construction methods and cohesion conventions, these experiments have shown the way forward into the computerised design experiments which will be discussed in Chapter Five.

Chapter 5

Prototype Design Software

5.1 Overview

This chapter is wholly concerned with the practice of the project. The semi-manual design examples, described in Chapter Four, document the three pattern construction methods of grid-based, progressive and co-ordinate based; each of which will be explored further in this chapter. Chapter Four also indicated the development of cohesion conventions to be followed in accordance with the design philosophy. Chapter One provided a set of gendered pattern features, which Chapters Two and Three used to analyse existing pattern. In this chapter the function of the gendered pattern feature set is to inspire and inform the design work, and to give a framework through which the resultant design examples may be discussed. One of the aims of the design work is to combine gendered features in such a way as to balance or democratise the pattern, hence while the patterns may be considered masculine or feminine, the unfamiliar arrangement of the gendered features will avoid negative and stereotypical gender connotations. By doing this, the design work is addressing the assertion in the hypothesis of 'acknowledging the current ambivalence in gender roles'.

The design experiments in Chapter Four highlighted the need for a less laborious construction method for the patterns, and, as the project is particularly concerned with demonstrating digital possibilities, it seemed logical to consider writing a software application capable of assisting in the production of non-repeating patterns. The result is a unique software prototype which is capable of constructing, displaying, storing and printing non-repeating patterns in a variety of design styles and colours. The process of its construction involved learning the programming language, *Visual C++*, and developing the software autonomously[1]. I can now see particular advantages with this approach, in that I was not limited by prior knowledge of the capabilities and technical procedures through with the programming language operated. Prior knowledge of Visual C++ may well have instilled a more formulaic, and perhaps, more timid, approach to the concepts and functions developed for the prototype. Of course this can also be disadvantageous in that lack of initial understanding led to a certain amount of frustration, and did affect the overall functionality of the prototype.

The chapter begins with a discussion on the technological advances in fabric printing that are leading this design work towards becoming a commercial possibility, and their implications for textile design innovation. Commercial textile printing, particularly

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[1] While this was not a collaborative project, I fully acknowledge the assistance given to me by the staff of Nottingham Trent University's Computer Department with the specific problems I encountered.

screen printing, usually involves the use of a repeating structure and limited colour palette. Neither of these two restrictions are necessarily a requirement for digital printing, hence new possibilities for innovation are opened up. The technical advances in long length inkjet printers for fabric is also discussed. This is followed by a discussion of the particular requirements and construction of the design software, detailing its abilities and highlighting its future capabilities through further research. Finally, each of the design examples is discussed in terms of the criteria and motivation, its method of construction, and observations concerning its visual qualities and success in terms of the combination of features from the gendered set and adherence to the cohesion conventions laid down in Chapter Four.

5.2 Technological Advancements in Fabric Printing

At present most mass-produced printed fabric, is produced by separately printing each colour, via rotary or flatbed screens, on to the fabric[2]. The development of inkjet printers, similar in principle to those used for colour printing on to paper, has been slow. Some additional requirements that account for this are: the ability to handle different cloth types with varying pile length and fibre shedding; a necessity to use inks or dyes which can be made colourfast; speed; and fineness of jets. However, commercial ink-jet printers for fabric are now available, but they are mainly used for producing samples, prototypes and one-off designs (Partridge 2000: online). It is anticipated that digital printers will be used for mainstream fabric printing within the next five to ten years (Partridge 1999: 24-26).

One of the major manufacturers of fabric inkjet printers, *Stork AG*, are currently marketing the *Amethyst* printer, which, according to their promotional literature, is capable of printing fabric up to 350 square metres in a day, on rolls of up to 250 metres in length and 1.65 metres in width (Stork 2002: online). This enables the commercial production of non-repeating textile designs, fed directly from computer to printer. The printed textile designer is effectively released from the shackles of both colour reduction (necessary for screen printing and usually limited to less than ten colours for fashion) and repetition. This opens up possibilities for new and innovative textile design.

In an online article which discusses the potential of fabric Inkjet printing, the Director of the Centre for Excellence of Digital Inkjet for Textiles at Philadelphia University,

Hitoshi Uji, states: 'Digital fabric printing has not only influenced visual styles, but also the concept and definition of printed textile design.' (Uji 2001: online) and adds that 'Traditional definition of textile design has been dictated by the repeat and colour limitation with a specific textile end use. (sic)' (ibid). Similar possibilities are being recognised by wallpaper designers, though as with fabric printing, inkjet printed wallpaper is still unusual, even though CAD is being used in the designing of patterns (Jackson 2002: 31). Jackson states that 'digital printing is... opening up exciting new possibilities for wallpaper designers...' (ibid).

New design challenges become apparent: for example, how could a designer produce a non-repeating design for a commercial 300 metre length? Theoretically, a digital image this size could be constructed and sent to the printer. However, the physical size of the digital file to store it would require a computer with a large amount of hard disk space and memory[3]. It would also be a very time consuming task to create the whole design, not unlike the task of hand-painting a 300 metre roll of paper. A smaller design which is enlarged to fill a larger surface would suffer from the digital degradation known as pixelation in which smooth lines become jagged edges. If repetition were not to be used, some form of automation would be desirable to aid filling the space. In this design work, the challenge is met by providing a range of parameters to the computer software which allow measured levels of freedom and control for the positioning, shape and size of the motifs which comprise the pattern.

5.3 Pattern Features and Qualities

The set of gendered pattern features with which this project has been working are: regularity, scale, angular to curved, and geometric to organic. As all the designs are of a non-repeating nature, the most extreme regular end of the regularity continuum, gendered masculine, is never visited. The scale of all these examples is considered to be small, according to the classification described in Appendix B. The cohesion conventions indicate smaller scale motifs to be the most obvious choice for compliance. Obviously, on a continuum, this implies that the extremely large end of the scale, gendered feminine, is also not visited by the design work. Staying away from the masculine extreme of the regularity continuum and the feminine end of the scale continuum encourages the democratisation of the gendered features by removing the

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[2] One exception to this is transfer printing, in which the coloured design is transferred from special paper on to fabric through heat processing.

[3] At present, even a file of 1m x 2m at a resolution of 100 pixels per inch takes up 88.7Mb in Adobe Photoshop, making it unwieldy and slow for an average Pentium computer with 128Mb of memory.

extremes of both. However, by removing one extremely masculine, and one extremely feminine end of two separate continua, something different to the neutrality of removing both of the extremes of one continuum is achieved.

5.4 Experimental Findings with Automated Techniques

As stated in the overview to this chapter, developing computer software was a logical step in the design process in which non-repeating patterns were being developed for printed textiles. The two main reasons for this were: it would allow the speed of the pattern production, after the inspiration and parameters for its creation were defined, to be considerably reduced, and it would help to validate the assertion that non-repeating patterns were viable for printed textiles produced by inkjet printer. In the event, the patterns generated by the software prototype were sent directly from the computer screen to an *Epson Stylus Colour 3000* inkjet printer with the capability of printing longer length patterns onto paper from a roll, giving a maximum printed area of 0.42 x 1.1 metres. While this is a relatively small-scale, and a paper printer used rather than a fabric one[4], the notional concept of the capability of transferring the designs directly from computer to printer has been achieved. The direct transfer from computer to printer also avoids the need for large digital storage space on the computer.

The experimentation and development with semi-manual techniques, as described in Chapter Three, resulted in the development of three construction methods and the formulation of cohesion conventions which enable them to satisfy the theoretical, commercial and creative aims of the practice-based part of the project. This knowledge was carried through into the automated phase of the software prototype, in which the design examples, based on twelve pattern types, are created through one of the three previously defined construction methods of: grid-based, progressive or co-ordinate positioning. The creative process in developing the patterns through the computer program was very similar to that used to produce the manual examples. An idea was conceived, developed, adjusted according to personal visual preference and formalised for evaluation. In some cases software limitations hindered the realisation of the concept; but in many more, using the computer inspired numerous design styles which were inconceivable during the semi-manual design work.

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[4] This printer can be now adapted for fabric use, using reactive dyes on pre-coated fabric supplied by the manufacturer.

The software prototype does not negate the role of the designer, as choices are offered at each stage. The current form of the software allows the user to choose between twelve pattern types, six colour ranges and different line styles. As it is a prototype however, any new design examples require further hard-coding, and hence require knowledge of *Visual C++*. Future development of the software could allow any designer to develop non-repeating patterns of various forms without the need to alter the *Visual C++* code.

Once the software code was written, creation of the design examples was a relatively quick process, even for a large surface. Printing times were reduced as the images generated are vector-based[5], so that the computer memory used to process them was also much smaller than the equivalent raster-based image[6]. Due to the geometrical precision of the vector-based imagery, *PhotoShop* 'finishing' techniques were not required to ensure the accurate linking of motifs, unlike many of the semi-manual design examples. However, this does lead all the design examples to having a geometric or digitally exact feel to them, which is not always desirable. As this is a prototype, future developments of the software could easily enhance this feature to allow both types of designs. The effects of this can be simulated by importing the designs into *PhotoShop* and manipulating them further.

5.5 The Design Software

Figure 5-A shows the initial window the user is presented with when opening the software prototype[7]. There is currently a choice of twelve pattern types that the user may select. Each pattern type was developed as an individual creative project; hence the application has a somewhat haphazard feel to its design, as a sketch book or visual research diary may have, rather than the consistency one might expect from a commercial product. The tendency to think of the prototype as commercial software is heightened by the use of standard *Microsoft Windows* in the formation of the menus, as seen in Figure 5-A. The user also has the option to choose a colour range, detailed in 5.5.1. For some pattern types, the extra options of line shading, variable line width, variable line colour and gradient shading, (selecting a line colour similar in tone to the

[5] Vector-based images store their construction details in mathematical equations, allowing geometrical precision in designs.

[6] Raster-based images store their construction details by recording the colour value of each pixel, making them suitable for photographs and images requiring a less precise feel.

[7] A version of the software prototype may be executed from the CD-ROM

fill colour) are available. The user can also choose the dimensions of the drawing area in millimetres. The default size of the drawing area is 400 x 300 mm.

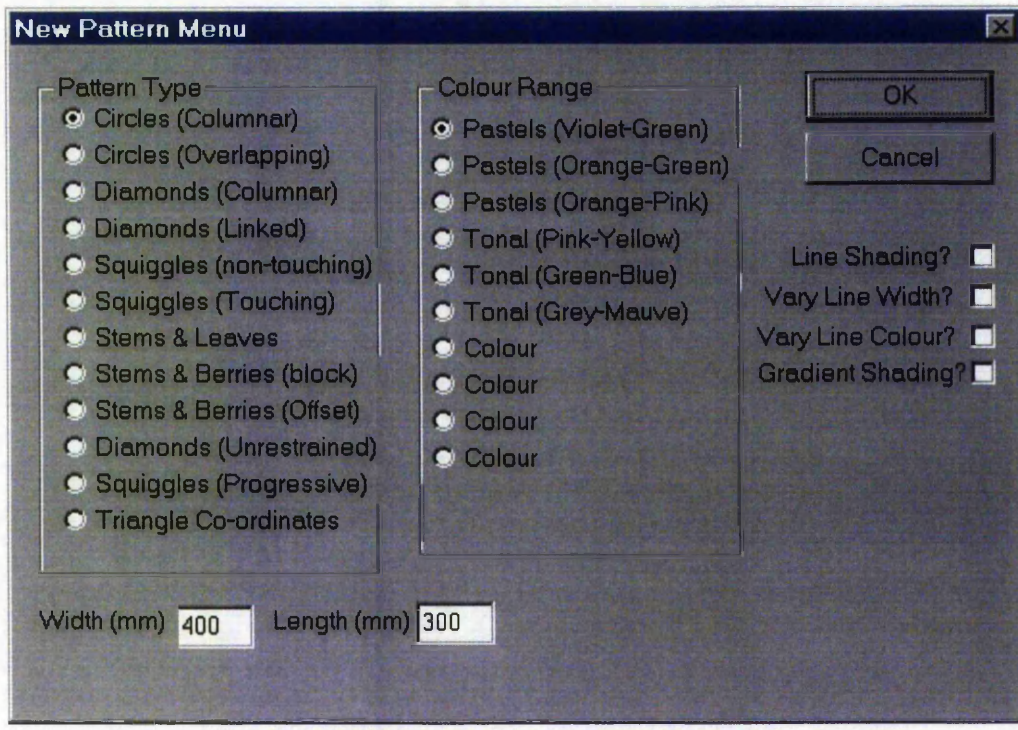


Figure 5-A: Main Menu for Option Choosing in Random Pattern Software

5.5.1 Colour Ranges

There are currently six different colour ranges available, each having ten colours (Figure 5-B). There are four extra option buttons available on the menu for future development (each labelled 'Colour'). The first three colour ranges are pastels, with white backgrounds. The second three provide a tonal selection of deeper colours, with either contrasting or dark backgrounds.

In each pattern type the tenth colour is used as the background colour. This decision was made for ease of programming. If the software had been written to allow for the selection of the background colour from any of the ten available, a complex routine would have to have been developed to prevent that colour from also being used as one of the foreground options, resulting in some motifs appearing to be absent from the finished pattern. Of course, if this had been allowed a greater variety of design examples may have been produced, but with less control for the designer.

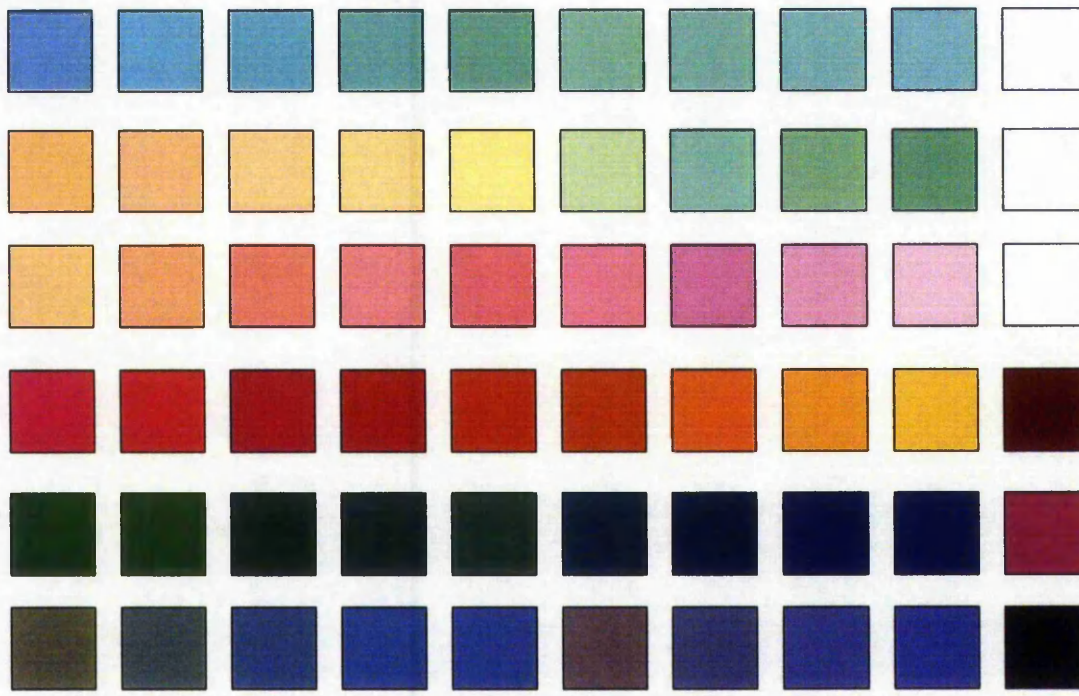


Figure 5-B: The Six Available Colour Ranges

The colour choices are hard-coded in the software by supplying the numeric red, green and blue values (RGB values). Each can take integer values from between 0 and 255. Consequently, the colours chosen in each colour range were not selected visually from a colour palette, but constructed by adjustment of the numerical values. While causing a few bad combinations, this has actually given a broader colour range than I may have selected visually, as a designer, and provided some interesting combinations. A future development of the software could allow the user to select their own choice of ten colours by implementing the standard *Windows* colour picker in the software and recording the RGB values. Obviously, the choice of colour range affects the visual qualities of the design enormously, particularly in terms of the shapes which emerge in the negative spaces when a strong background colour is selected. The main illustrations accompanying the design examples below, all display the first colour range, for consistency. In some cases, a second illustration is given to indicate the effects of using a darker ground.

As has been discussed throughout the thesis, colour plays an important role in gender associations, and as might be expected, some of these colour ranges are endowed with stronger gender connotations than others. However, gender associations did not play a part in the selection of the ranges. Any colours used would have gender implications, even black and white. By providing different colour ranges, the gendered pattern features can be analysed without too much emphasis on the colour selection.

5.5.2 The Pattern Types

As has been stated, twelve pattern types are available from the software prototype, and each is discussed individually below. Of those twelve, seven use the progressive construction method, four use the grid-based method and only one uses the co-ordinate-based method. This is partly due to the haphazard nature of the creative process, as discussed above; the pattern types were developed as and when inspiration came. Also, the development of some construction methods allowed different pattern types to be easily constructed once the first one had been coded; the progressive method is an example of this. This would also have been true for pattern types using the co-ordinate based construction method. However while different motifs and scales provided substantially different qualities in the progressive pattern types, it was not felt that this would be the case for the co-ordinate based method.

While subsequent construction of simple grid-based designs may have been simplified after the construction of the first, only complex linking and rotational motifs were constructed, in compliance with the cohesion conventions developed in Chapter Four, which legislated that the grid structure should not be too visually obvious. Rotation of complex motifs consisting of multiple lines and arcs proved difficult in *Visual C++*, and hence the linear elements constructing the motif had to be re-coded for each rotation. Consequently, producing different pattern types of the same construction methods was as time-consuming as the development of the first.

To ensure that a thorough analytical examination of each pattern type is given, each section follows the same format. Initially, a design example from the pattern type is illustrated at actual scale. The discussion is then broken down into the distinct areas of: design criteria; program procedure; observations; and recommendations. The design criteria section explains the initial motivation of the pattern type, while the predetermined and user-determined features and the program procedure sections give logical descriptions of the parameters and the software routines used to construct the patterns[8]. The observation section is used to identify the qualities displayed by the pattern type and their relation to the gendered pattern feature set. It is important to stress here that the pattern types are often referred to as masculine or feminine; meaning that they have more of the features previously attributed to one gender than the other, but not implying that the viewer should 'read' the design example as

[8] This is often referred to as pseudo-code by the computing fraternity, though the version used here does not follow any formal convention and has simply been used to help the reader follow the logic of the program

gendered. To some extent, being able to do so would show a failing in the aim to democratise the gendered features. Finally, the recommendations section suggests further possibilities for the pattern type.

5.5.2.1 Pattern Type 1: Circles (Columnar)

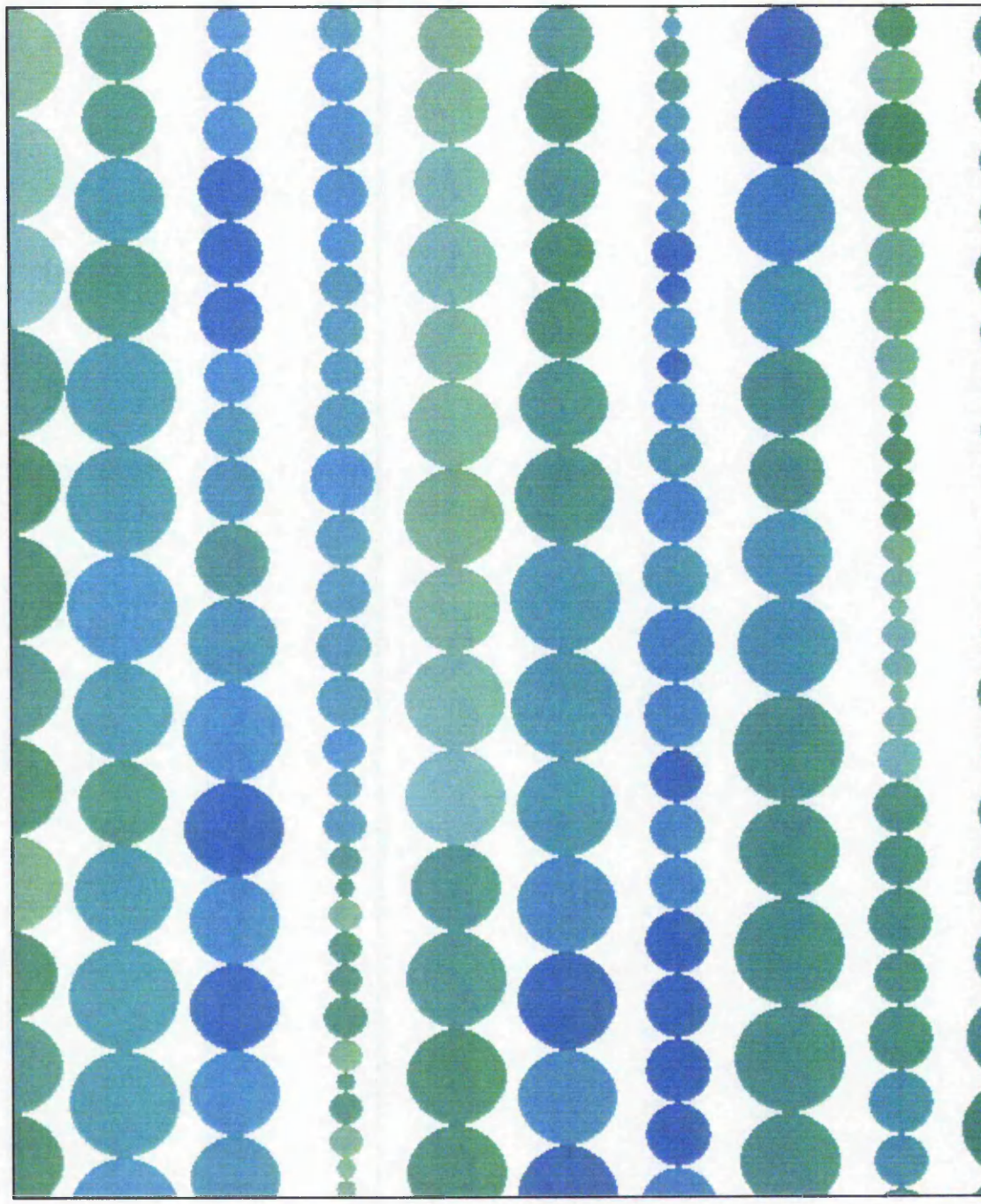


Figure 5-C: Circles (Columnar)

5.5.2.1.1 Design Criteria

This pattern type is constructed through the progressive method, and inspired by the semi-manual example illustrated in Figure 4-NN. The use of a circular motif, with its feminine connotations is balanced by the columns or stripes which endow the design with a feeling of regularity, which has masculine connotations. While the random parameters give an irregular change in motif scale and colour, the restricting parameters limit variation in colour, and the scale of the motif, from one to the next. In other words, the previous circle in the column limits both the size and the colour choices for its successor to values close to its own, and change in size or colour will be incremental throughout the column therefore no dramatic changes in scale or colour can take place as the column progresses. In this pattern type the circles in each column are prevented from overlapping, and may be compared to the following pattern type, see Figure 5-F, in which overlapping was permitted[9].

5.5.2.1.2 Predetermined Features (hard-coding)

Nine sizes of circle are available ranging from 4mm to 20mm[10] diameters in increments of 2mm, as illustrated in Figure 5-D. The width of the gap between each column is equal to the largest circle diameter of 20mm. This allows possible, but unlikely touching of circles, but no overlapping.

Figure 5-D: Nine Circle Sizes Available for Pattern Type 1

5.5.2.1.3 User Determined Features

Colour range is selected from the menu, using one of the colour ranges displayed in Figure 5-B.

5.5.2.1.4 Program Procedure

1. SET background colour to be the tenth colour in the colour range selected by the user.
2. LOCATE a vertical guide for positioning the columns, initially the left hand edge of the canvas and subsequently 20mm to the right of the previous one.

---

[9] A visual demonstration of the program procedure for this pattern type is available on the accompanying CD-ROM

[10] Please note: the conversion used from screen resolution to print resolution causes a reduction in scale of about 20%, hence the circles displayed in the design examples are smaller than the diameter sizes given in millimetres.

3. Draw the first circle in the first column as follows:
   - SET diameter size = RANDOM selection of 4, 6, 8, 10, 12, 14, 16, 18, 20mm
   - SET colour = RANDOM selection of any of the first nine colours in the range.
   - LOCATE position => Align uppermost point with top edge of canvas and centre point along vertical guide
   - DRAW and COLOUR the circle
4. Draw the rest of the circles in the column as follows:
   - SET diameter size = RANDOMLY select next largest, next smallest or same size as previous circle in column.
     EXCEPT:
     IF the previous circle had the minimum diameter, omit the smaller option.
     IF the previous circle had the maximum diameter, omit the larger option.
   - SET colour = RANDOMLY select from same, next left or next right as colour of previous circle.
     EXCEPT:
     IF the previous circle used number nine in the range, omit the right option.
     IF the previous circle used number one in the range, omit the left option.
   - LOCATE the position =>Align uppermost point with bottom point of previous circle and centre point along vertical guide.
   - DRAW and COLOUR the circle.
5. REPEAT step 4 until the bottom of the drawing area is reached.
6. START next column by REPEATING procedure from step 2.
7. FINISH when the vertical guide position extends beyond the right hand edge of the drawing area.

5.5.2.1.5 Observations

The columns or stripes of this example give it an immediately ordered feel, which is added to by the uniformity brought about through the use of a single motif and the gradual changes in colour and size of the motifs. However this is somewhat counterbalanced by the 'quirkiness' of the movement in colour and size given by the use of random parameters and the irregularity of the negative white spaces which form between the columns of circles. The circular motif, contradictorily, places the gendered connotations towards the masculine end of the geometric to organic continuum and the feminine end of the angular to curved continuum, and helps to displace the stereotypical association usually made through these features. The cohesion conventions have largely been adhered to, as the design has a sense of uniformity, despite the random elements. However, from a commercial perspective, the usual considerations would need to be taken into account in the pattern cutting of striped fabric.

On balance, taking into account all of the above factors, this design example can be considered to be on the masculine side of the gender continuum. One method of manoeuvring the pattern type towards the feminine is demonstrated in Figure 5-E.

Here, the sections of program code which restrict the circle colour and size to incremental changes have been removed. The columns are still the same width apart, but the design example looks visually much less regular. Rather than follow the columns, as my eye tends to do when looking at Figure 5-C, I now find myself attempting to discover patterns by locating circles of the same colour; the lilac circles standing out particularly in a way that they did not when surrounded by circles of a similar colour. The negative spaces between the columns now display much less regular shapes which also add a more irregular, less ordered and less striped appearance.

5.5.2.1.6 Recommendations

Further options could be given to the user which would allow them to choose their own minimum and maximum circle diameter sizes, together with the incremental value between each one and the selection of distance between each column. In the light of the variation shown in Figure 5-E, the user could also be provided with the ability to switch on or off the incrementally graded variations in colour and size.

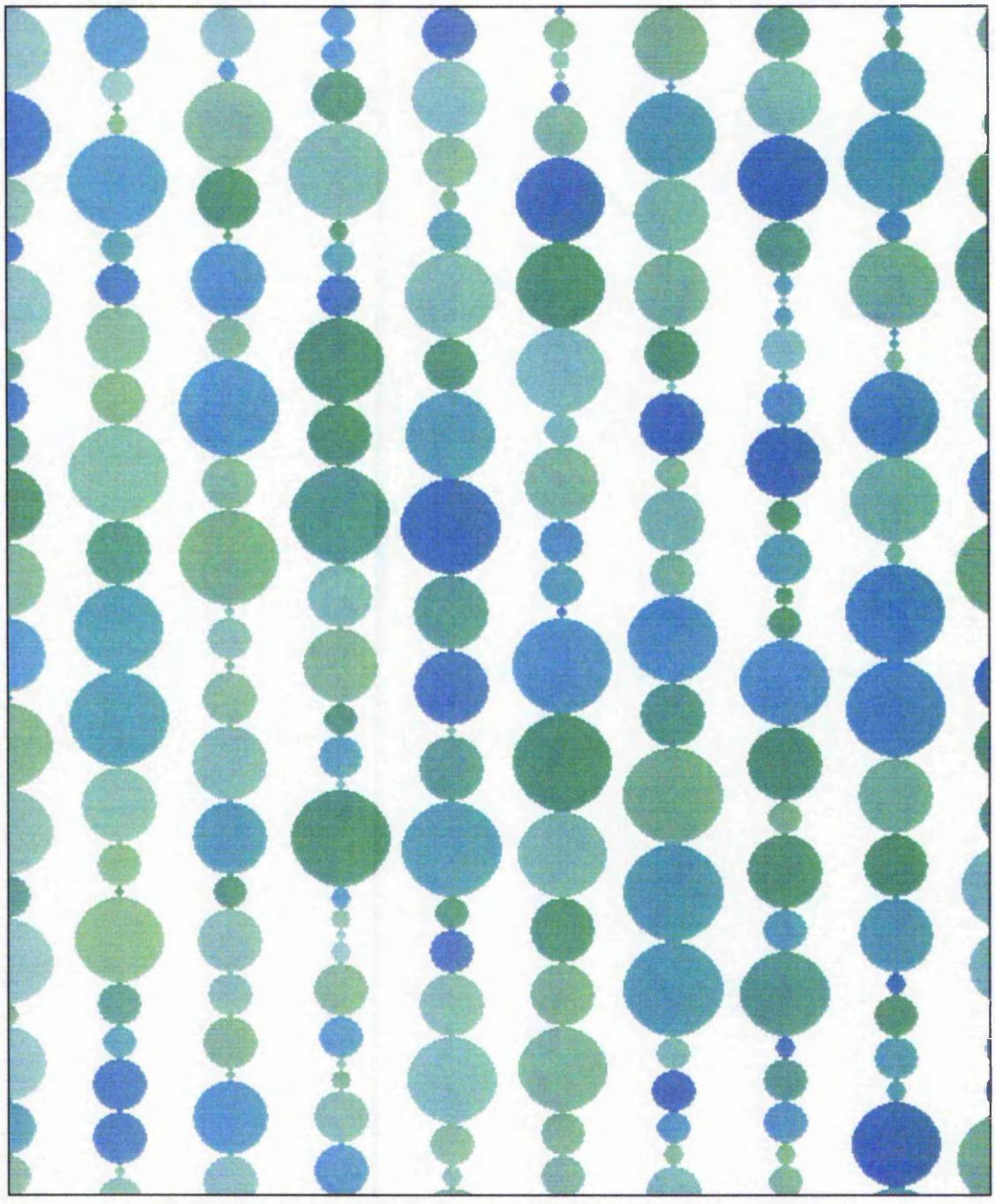


Figure 5-E: Circles (Columnar) without Colour & Size Incrementing

5.5.2.2 Pattern Type 2: Circles (Overlapping)

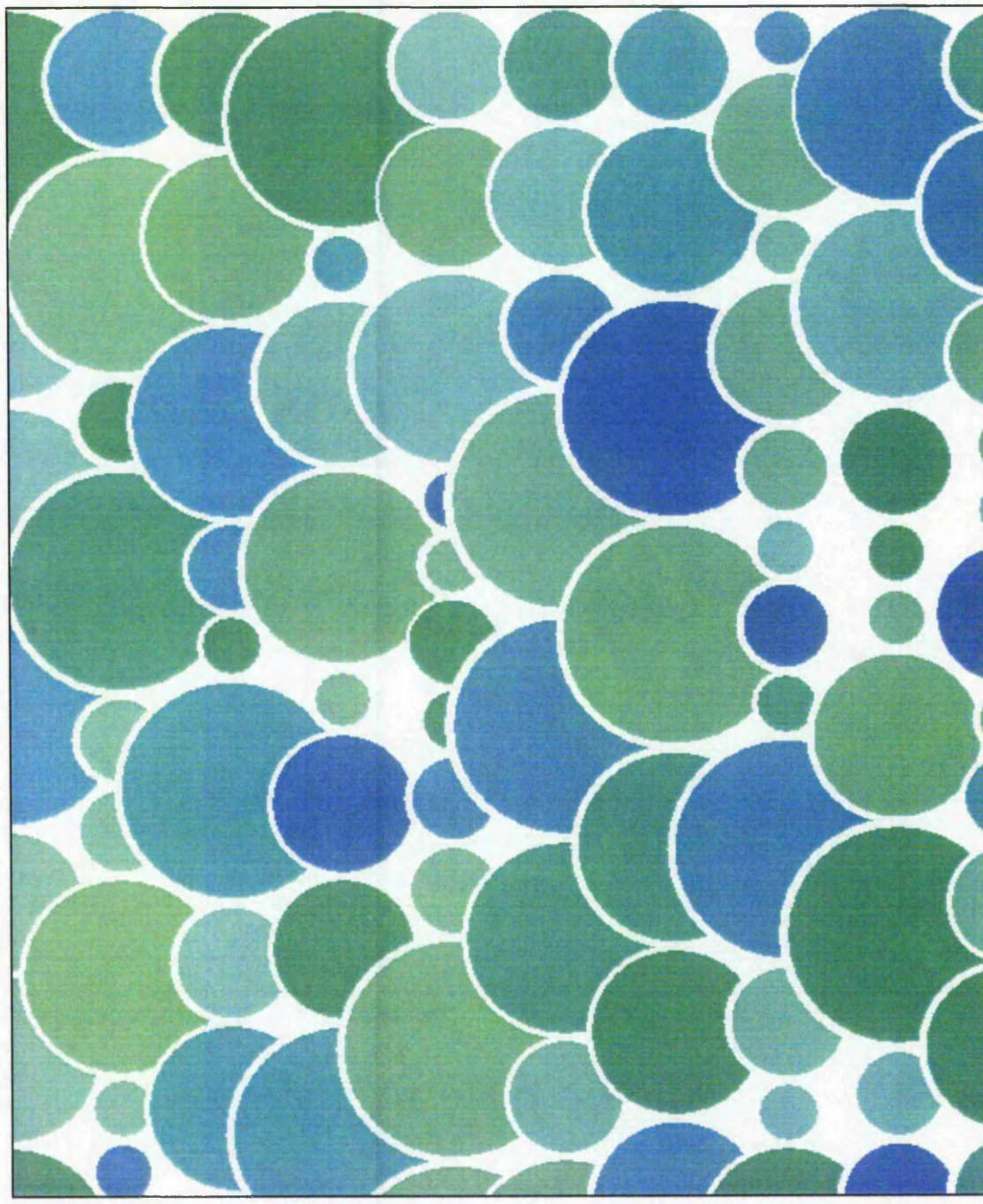


Figure 5-F: Circles (Overlapping)

5.5.2.2.1 Design Criteria

The concept for this pattern type is an extension of the results of Pattern Type 1, and as before, the pattern type belongs to the progressive construction method. The application of the construction method is very similar, with several distinct differences all of which are intended to introduce more irregularity into the design. In this

example, the columns are closer together, allowing the circles to overlap; the circles are given variable width white outlines, regardless of the colour range selected; the circular motifs have a wider variation in scale, but there are less sizes available; and no parameters are used to force the gradual change of colour and scale.

The motifs, and columnar structure being identical to Pattern Type 1, the main emphasis in this design pattern type was to reduce the regularity further, and hence invoke more femininely connoted features.

5.5.2.2.2 Predetermined Features (Hardcoding)

The circles are always drawn with white outlines that can vary randomly in width from 0.7 to 1.4 mm, in 0.1mm increments. There are seven available circle sizes from 12 to 42 mm, in 5mm increments. The columns are 20mm apart.

5.5.2.2.3 User Determined Features

Colour range is selected from the menu.

5.5.2.2.4 Program Procedure

1. SET background colour to be the tenth colour in the colour range selected by the user.
2. LOCATE a vertical guide for positioning the columns, initially the left hand edge of the canvas and subsequently 20mm to the right of the previous one.
3. DRAW the a circle in the column as follows:
    - SET diameter size = RANDOM selection of 12, 17, 22, 27, 32, 37, 42 mm.
    - SET line width = RANDOM selection of 0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.3, 1.4 mm.
    - SET colour = RANDOM selection of any of the first nine colours in the range.
    - LOCATE position => Position centre of circle to pass through vertical guide and align with bottom of previous circle.
      EXCEPT IF first in column align top of circle with top edge of canvas.
    - DRAW and COLOUR the circle
4. REPEAT step 3 until the bottom of the drawing area is reached.
5. START next column by REPEATING procedure from step 2.
6. FINISH when the vertical guide position extends beyond the right hand edge of the drawing area.

5.5.2.2.5 Observations

By varying a few parameters, a quite different effect is produced to that of Pattern Type 1. The overlapping circles camouflage the columnar structure and the striped effect is only noticeable in sections where three or four of the smaller motifs are placed

next to each other. The overlap also creates shapes other than circles within the design example; these are highlighted by the white outline around them. As the software constructs the pattern from left to right, the circles on the left are always partially covered by those on the right, giving an appearance slightly reminiscent of fish scales. As the background of this design example is also white, the outlines are only seen on overlapping circles, adding to an irregular feel in which lines are sometimes present and sometimes absent.

Though the structure is still columnar, overall visual effect is not. The curved outlines move this pattern type toward the feminine end of the angular to curved scale, and by breaking up the circularity of the motifs, move slightly away from the masculine end of the geometric – organic scale. The use of larger motifs gives a tendency towards the feminine, as does the wider division between the smallest and largest motif size than in the last example. The cohesion conventions have been followed by fixing a minimum and maximum size for the motifs, and restricting the colours to fall within one given colour range. However, in this pattern type it is possible, if extremely unlikely due to the laws of probability, that a section of the design may appear in which long lengths of two or more columns displayed only small circles. As identified earlier, the small sections of Figure 5-F in which this occur, particularly in the middle of the second full column from the right, are particularly obvious and my eye is immediately drawn to them. If this phenomenon occurred in larger areas, very different qualities would be seen to that of the overall design.

A further consideration is the use of a dark or strongly coloured ground, which would undoubtedly alter the appearance of this pattern type as the circle outlines remain white, and hence are visible around all the motifs, not just the overlapping ones. The design example in Figure 5-G clearly demonstrates this. Apart from the overall feel of the design, which is strongly affected by the use of bright colours over pastel ones, the chains of smaller circles are made more obvious by the white outlines and lack of overlap. In small measure, I feel this is a visually appealing effect, as it enhances the feel of a secret underlying structure which the viewer can only glimpse. If it did occur in larger areas, a feeling of visual discord may well accompany it.

With either ground, the pattern type has adopted more femininely connoted features from the gendered set and has moved towards the feminine side of the gendered sliding scale, with only vestiges of geometry and regularity through the glimpses of the columnar structure endowing it with masculine features.

5.5.2.2.6 Recommendations

This pattern type is essentially a variation of Pattern Type 1, hence by giving the user the extra parameters suggested in the previous recommendations section, and adding an option to allow variable outlines around the circles, this pattern type becomes redundant. The outline option could be further developed with extra colour options. Further possibilities could include allowing a selection of different motifs, or giving the user the option of providing their own motifs.

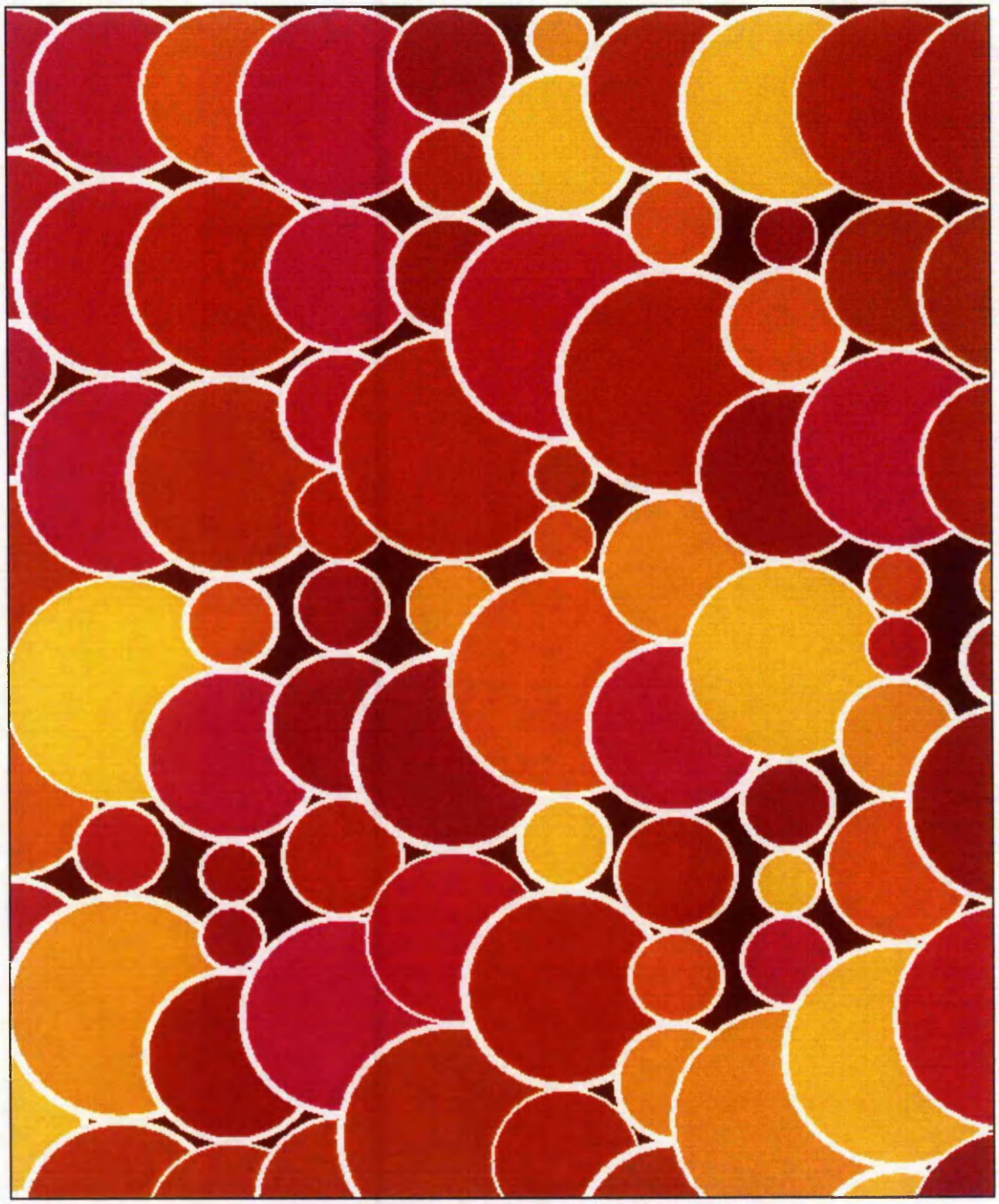


Figure 5-G: Pattern Type 2, in colour range with dark ground

5.5.2.3 Pattern Type 3: Diamonds (Columnar)

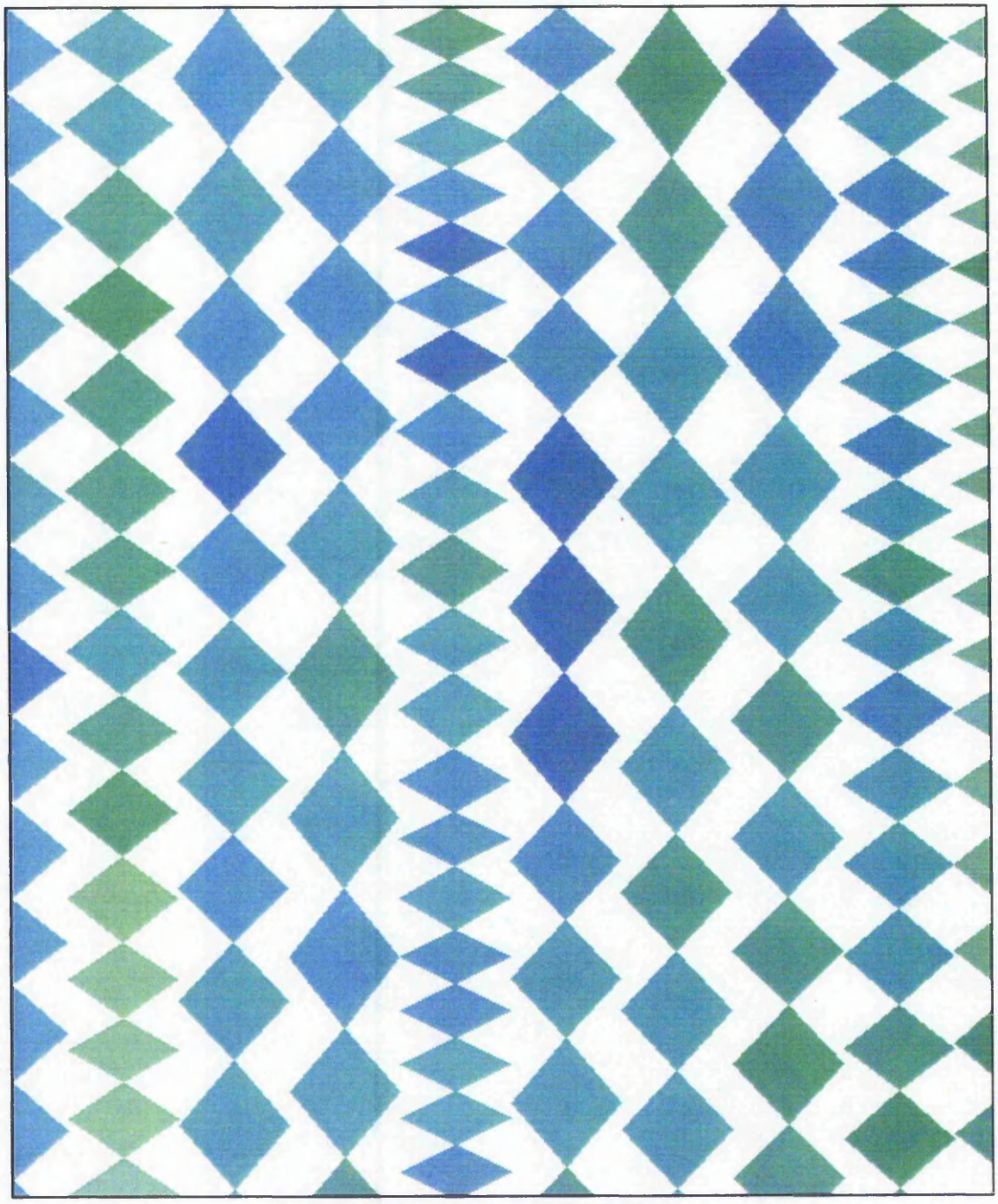


Figure 5-H: Diamonds (Columnar)

5.5.2.3.1 Design Criteria

Again, this pattern type uses a progressive construction method. It is constructed by drawing diamonds in columns, so that the bottom vertex of one diamond shares its co-ordinates to the top vertex of the next. The width of the diamond is fixed, but the height varies randomly. In a similar manner to the Columnar Circles pattern type, each

diamond is dependent on the last for its colour, size and position in the column by virtue of the colour and size of the preceding diamonds. The colours are incremental, so one diamond in the column can be either the same colour as the previous diamond in the column, or either of the colours adjacent to it in the colour range. The height changes follow the same logic as the colour changes.

The angular and geometric motif provides elements from the masculine ends of the gendered pattern feature continua while the irregularity provided by the changes in shape and colour give an element from the feminine end.

5.5.2.3.2 Predetermined Features (Hardcoding)

The diamonds are 20mm wide and the columns 20mm apart. The height of the diamonds can vary from 10mm to 26mm in 2mm increments.

5.5.2.3.3 User Determined Features

Colour range is selected from the menu.

5.5.2.3.4 Program Procedure

This procedure follows the same logic as Circles (Columnar), with the circle diameter replaced by the height of the diamond.

5.5.2.3.5 Observations

Though this pattern type is very similar in its structure to Pattern Type 1, with the circular motif replaced by a diamond, it was initially thought that the overall effect would be a more masculine one. However, by varying the heights of the diamonds, the actual motif shapes change, rather than simply get larger or smaller. This seems to me to give a less regular feel than the design example in Figure 5-C. In that example, it appears that I quickly recognise all the shapes to be circles and cease to pay them any more attention. In this pattern type, shown in Figure 5-H, I am unable to do that, and instead my eye is drawn to columns within the pattern which look very different to others, such as the fifth column from the left, which comprises mainly smaller height diamonds. My eye then looks for another similar area, and spots the rightmost column of whole motifs. A quick comparison shows me these two columns are different, the latter having larger diamonds as the column reaches the bottom, and I continue to look for patterns in other areas. These areas of variation cause me to keep looking for a pattern in a manner considered in Chapter Four.

The irregularity in this design example is supplemented by the use of diamonds of a fixed width and columns the same width apart. Unlike the Columnar Circles, whose varying diameters made touching across columns unlikely, the fixed width of the diamond make it quite likely that they will touch, and the illustration, above, shows this clearly in several places. The increased frequency of diamonds touching across columns, and their general closer proximity lessens the striped appearance of the pattern type. As the columns in the pattern type can display quite a variation in style, and may form quite large areas of regularity, such as the three columns to the right of the first smaller diamond column, the cohesion conventions may be considered to be being broken. However, this Pattern Type demonstrates how the use of smaller scale motifs circumvent some of the problems irregularity could cause;over a large area the variations would almost certainly even themselves out.

Despite the increased irregularity, and the movement towards the feminine side of the gendered continua this gives, to my eye this design example *does* look more masculine than the columnar circles of Figure 5-C, which suggests that the strongest gendering influence, for me at least, is the angular to curved factor in the example. Although it may well be that I am invoking other known stereotypes of dress, such as the diamond pattern on Men's Argyll sweaters and the suggestion of strings of beads which the columnar circles evokes.

5.5.2.3.6 Recommendations

Once again, this progressive pattern type could be incorporated into a variation of Pattern Type 1, and the same types of extra functions provided, for example, allowing the user to choose minimum and maximum diamond height, and column width. Option to allow outlines around the diamonds, and overlapping columns, would provide extra irregularity, as did the overlapping circles in Pattern Type 2, Figure 5-F. As with the Circles example shown in Figure 5-E, the ability to 'turn off' the functions which restrict the diamonds to incremental changes in scale and colour could be provided as an option. The choice of varying the diamond width as well as height could also be added.

5.5.2.4 Pattern Type 4: Diamonds (Linked)

Figure 5-I: Diamonds (Linked)

5.5.2.4.1 Design Criteria

This is a progressive pattern type, inspired by Pattern Type 3, Diamonds (Columnar). This pattern type was an experiment into finding ways of instilling more cohesion and less of a striped feel into the pattern. In order to do this, the diamonds, or more

precisely quadrilaterals[11], are all linked across columns, by their left and right vertices. The height of the diamonds is not limited to incremental variations, while the colour is. This alteration has the effect of making the background, or negative spaces, of similar size and shape to the foreground. It also relieves the rigidity of the columnar structure and provides a wider variety of shapes. While the shapes are still essentially geometric, their irregularity in shape adds a feminine factor from the gendered pattern set.

5.5.2.4.2 Predetermined Features (Hardcoding)

The columns are 20mm apart. The height of the diamonds can vary from 18mm to 22mm in 1mm increments. The width of the motif is fixed as it is positioned, rather than measured through its vertices, is fixed at 20mm.

5.5.2.4.3 User Determined Features

Colour range is selected from the menu.

5.5.2.4.4 Program Procedure

1. SET background colour to be the tenth colour in the colour range selected by the user.
2. LOCATE a vertical guide for positioning the columns, initially 10mm from the left hand edge of the canvas and subsequently 20mm to the right of the previous one.
3. Draw the first motif in the column as follows:
   - SET motif height = RANDOM selection of 18, 19, 20, 21, 22 mm
   - SET colour = RANDOM selection of any of the first nine colours in the range.
   - SET left vertex = RANDOM selection of half motif height, 1mm above half way position, 1 mm below half way position.
   - SET right vertex = RANDOM selection of half motif height, 1mm above half way position, 1 mm below half way position (independent of left vertex).
   - LOCATE position => Align top vertex with top edge of canvas and vertical guide
   - DRAW and COLOUR the MOTIF
4. Draw the rest of the diamonds in the column as follows:
   - SET motif height = RANDOM selection of 18, 19, 20, 21, 22 mm
   - SET colour = RANDOMLY select from same, next left or next right as colour of previous motif.
     EXCEPT:
     IF the previous motif used number nine in the range, omit the right option.
     IF the previous motif used number one in the range, omit the left option.
   - SET left vertex = right vertex of equivalent motif in previous column.

---

[11] As the linking procedure allows the left and right vertex of the diamond to be positioned at an uneven height, the motifs form irregular quadrilaterals rather than diamonds.

- SET right vertex = RANDOM selection of half motif height, 1mm above half way position, 1 mm below half way position (independent of left vertex).
- LOCATE position => Align top vertex with bottom vertex of previous motif in column and vertical guide
- DRAW and COLOUR the motif.

8. REPEAT step 4 until the bottom of the drawing area is reached.
9. START next column by REPEATING procedure from step 2.
10. FINISH when the vertical guide position extends beyond the right hand edge of the drawing area.

5.5.2.4.5 Observations

This pattern type has some flaws in its construction which prevent it from following the cohesion conventions. Each subsequent column is dependent on the last, and as the motifs can vary in height, the relative position of, say, the tenth motif in the first column may be significantly above or below the tenth motif in the next column. The software logic dictates that the left hand vertex of the tenth motif in second column will become the right hand vertex of the tenth motif in the first column. This may lead to the top left edge of the motif becoming quite long in order to meet its linking partner. The right hand vertex, however, is only dependent on the distance between the top and bottom vertex, and hence is relatively stable. The illustration in Figure 5-J, shows this phenomenon occurring and the degradation it displays.

The top part of the design example shown in Figure 5-I shows what I consider to be an interesting variation on the previous pattern type; Figure 5-I displays not only irregularity but also less angularity, as the motifs do not display the harsh pointed vertices that their diamond counterpoints do. However, even within the small section of the pattern shown here, towards the bottom of the image, symptoms of the degradation explained above are occurring and the motifs are beginning to distort. Despite the interesting balancing of the gendered pattern features, the lack of conformity to the cohesion conventions prevents this pattern type, in its current form, being suitable for commercial consideration.

5.5.2.4.6 Recommendations

This pattern type requires a method of stabilising the motifs to produce an all-over effect, similar to that shown in the top half of Figure 5-I. In programming terms, this would require complex reworking of the code logic. One solution could be to store the location of each motif and refer to it in the sizing decisions for the next. This may be helped by constructing the pattern row by row rather than column by column. Computer memory could become a problem if large arrays of data needed to be

stored. This is an example of a pattern type in which the desired effect could easily be achieved with scissors and coloured paper, but which highlights very complex issues in programming which were not foreseen at the inspiration stage.

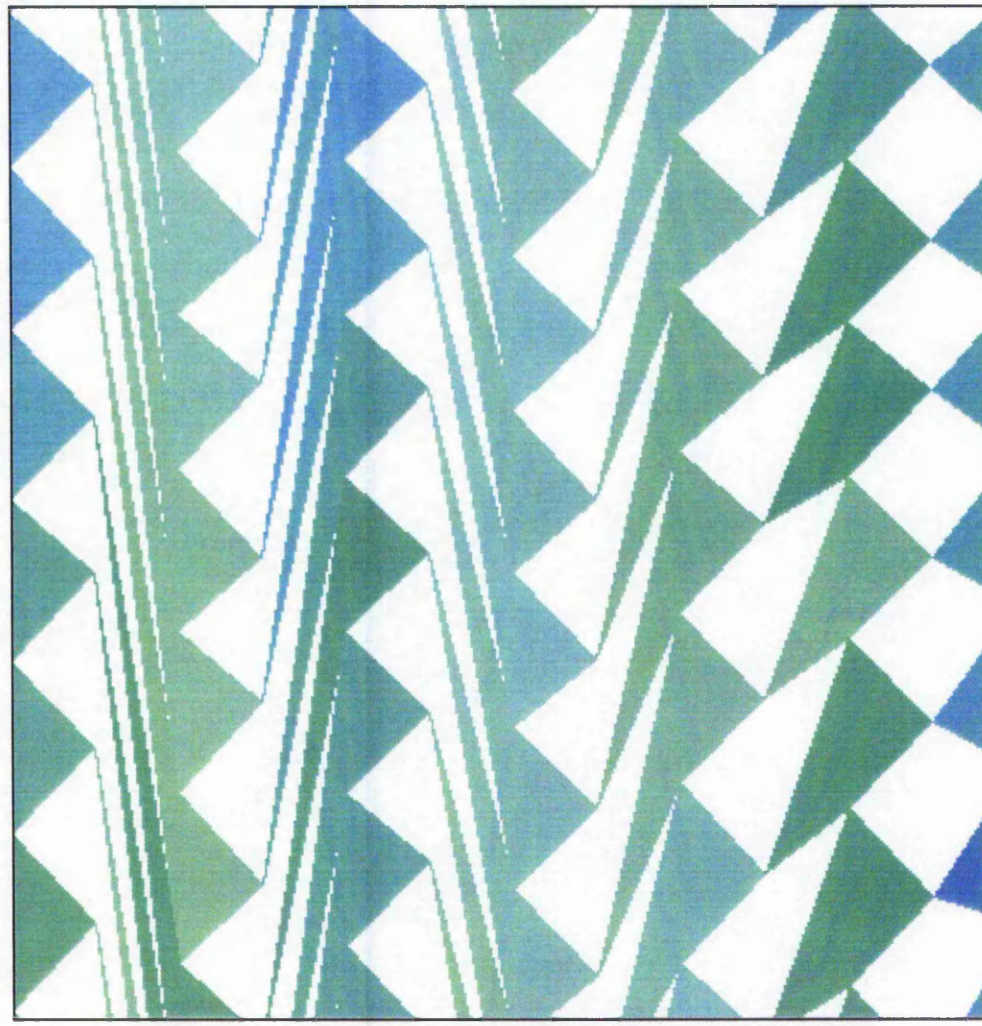


Figure 5-J: Section of Diamonds (Linked) Showing Degradation

5.5.2.5 Pattern Type 5: Squiggles (Non-touching)

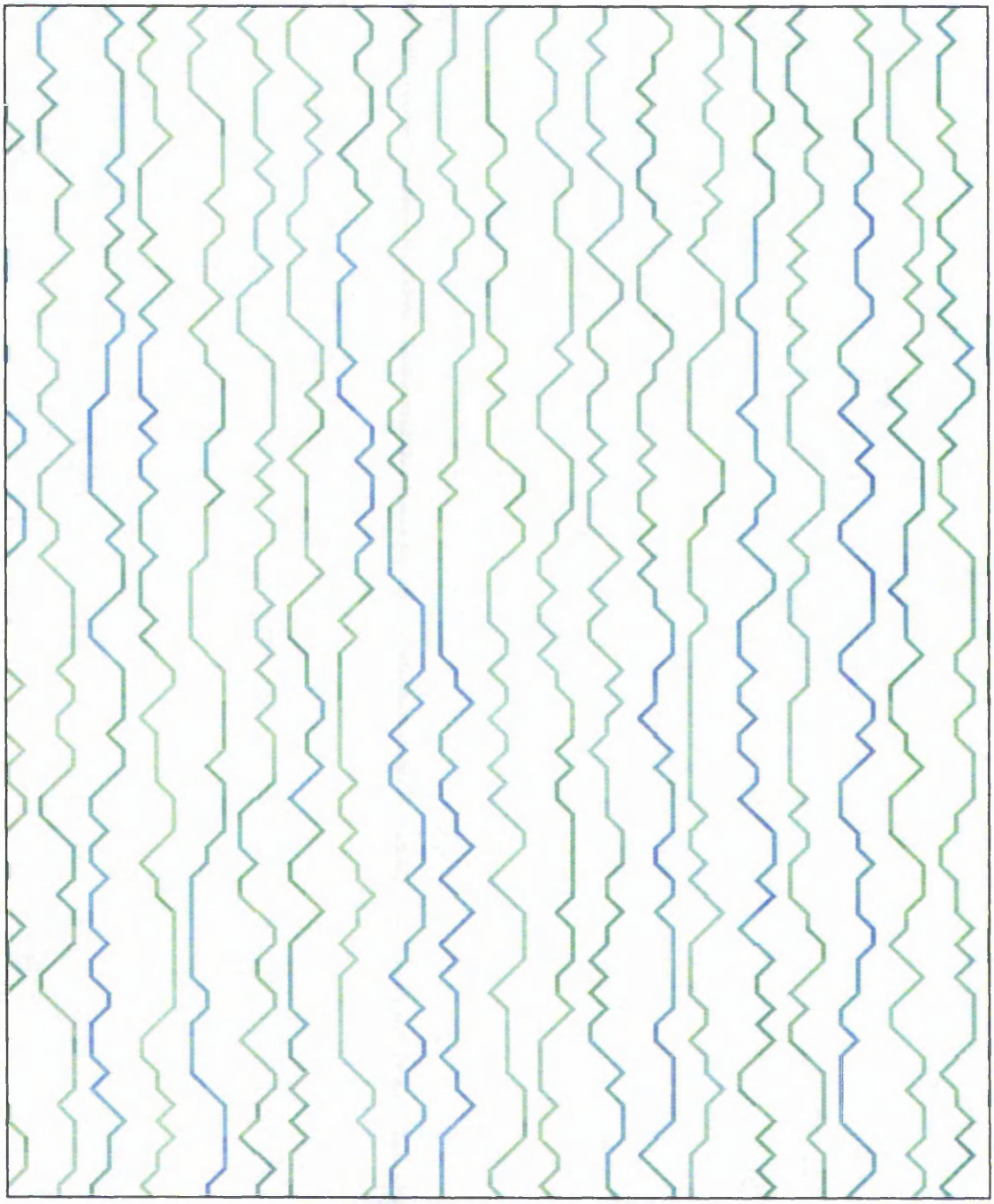


Figure 5-K: Squiggles (Non-Touching)

5.5.2.5.1 Design Criteria

This progressive pattern type varies from the previous four in that the motif is simply a line, rather than a shape. It was inspired by the semi-manual example displayed in Figure 4-MM. Each column takes the form of a line, which at the unit level can be vertical, or at forty-five degrees to the left or right. In this pattern type the lines are

prevented from crossing each other by restricting the direction of the line once it reaches a certain vertical boundary.

The use of a straight line and the angular changes of direction give masculine attributes, while the 'wiggliness' which results from the random choices of direction of the lines gives feminine attributes.

5.5.2.5.2 Predetermined Features (Hardcoding)

The columns are 9mm apart. The vertical height of the line unit is 3mm. For diagonal lines, the horizontal distance from the vertical column vertex is 3mm, to either the left or right. The line width is 1mm.

5.5.2.5.3 User Determined Features

Colour range is selected from the menu.

5.5.2.5.4 Program Procedure

1. SET background colour to be the tenth colour in the colour range selected by the user.
2. LOCATE a vertical guide to restrict the movement of the line, initially against the left hand edge of the canvas and subsequently 9mm to the right of the previous one.
3. LOCATE two vertical boundaries, a left boundary 3mm to the left of the vertical guide, and a right boundary 3mm to the right of the vertical guide.
4. Draw the first line in the column as follows:
   - SET line direction = RANDOM selection of 45° left, 45° right, vertical
   - SET colour = RANDOM selection of any of the first nine colours in the range.
   - SET start point = top edge of canvas, in line with vertical guide.
   - SET end point = 3mm vertically below start point
   - DRAW & COLOUR line.
5. Draw the rest of the lines in the column as follows:
   - SET line direction = RANDOM selection of 45° left, 45° right, vertical
     EXCEPT:
     IF the end point of the previous line intersects with the right vertical boundary, omit the option of 45° right
     IF the end point of the previous line intersects with the left vertical boundary, omit the option of 45° left
   - SET colour = RANDOMLY select from same, next left or next right as colour of previous line.
     EXCEPT:
     IF the previous line used number nine in the range, omit the right option.
     IF the previous line used number one in the range, omit the left option.
   - SET start point = end point of previous line.

- SET end point = 3mm vertically below start point.
- DRAW and COLOUR the line.

6. REPEAT step 5 until the bottom of the drawing area is reached.
7. START next column by REPEATING procedure from step 2.
8. FINISH when the vertical guide position extends beyond the right hand edge of the drawing area.

5.5.2.5.5 Observations

The use of small lengths of lines allows them a slightly meandering appearance, which moves away from the geometric and towards the organic and less geometric, and towards the curved and away from angular. Another contributory factor to this effect is the restriction which prevents lines touching, in that it also necessitates that a diagonal line can carry on in the same direction for a maximum of two units, hence the only long straight lines which can occur are vertical. Contradictorily, though, it is these vertical lines which are most prominent to my eye, and do give a very rigid striped appearance. This is compounded by the distance between the lines, which prevents touching or overlapping, but consequently allows the negative space between the lines to contribute to the striped effect. Overall, while the meandering lines move away from the geometric and angular extremes of their continua, they do not yet reach the organic and curved extremes.

The cohesion conventions are adhered to, in that the pattern does have quite a uniform feel, despite the randomness of the wiggling lines. The use of a small line length, thin line width and restrictions in the movements of the line all add to this. Figure 5-L demonstrates an example of what this pattern type may look like if the parameters controlling the lines' movement to the left and right are removed. While in my opinion this does present a more interesting image, the lack of conformity with the cohesion conventions is clear. A large empty space appears towards the bottom of the left hand side of the example, and several areas of 'knotted' overlapping lines appear in overcrowded areas. Once again, though, at this small scale it may not present a problem, as the likelihood of an empty area large enough to cause concern in the construction of a garment is remote, though not, of course impossible.

5.5.2.5.6 Recommendations

Extra parameters could be provided which allow the user to vary the line width and unit size, and give outlines around the lines. The pattern type could also be extended to allow the option of touching or overlapping lines, with more freedom to move over the canvas. If restricted random co-ordinates were used instead of fixed vertical and

diagonal lines, a more organic feel could develop. The routine could also be expanded to draw another set of lines from left to right rather than top to bottom, allowing the user to choose vertical, horizontal or checked, with both sets of lines drawn in one drawing area.

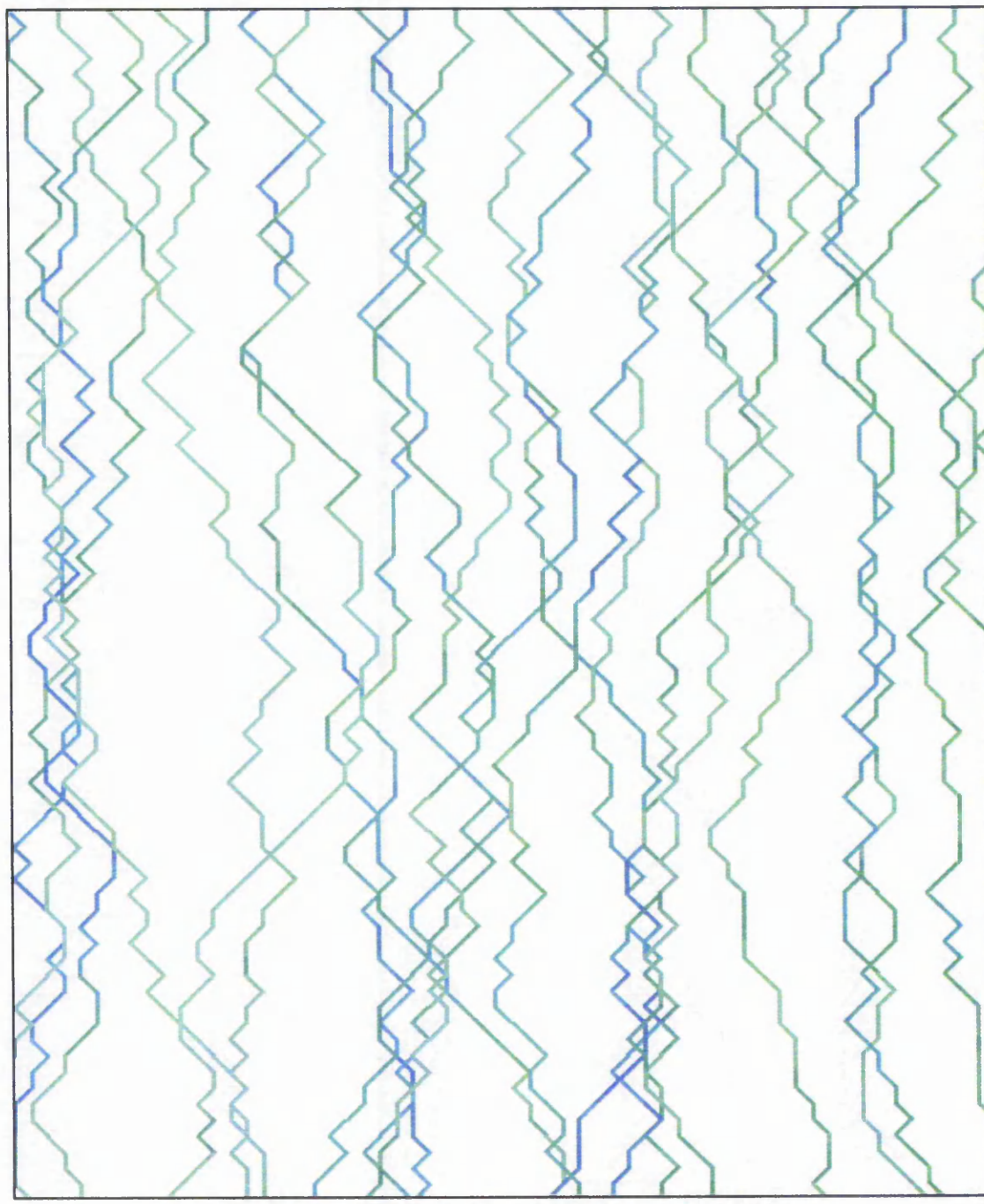


Figure 5-L: Squiggles with direction restrictions limited

5.5.2.6 Pattern Type 6: Squiggles (Touching)

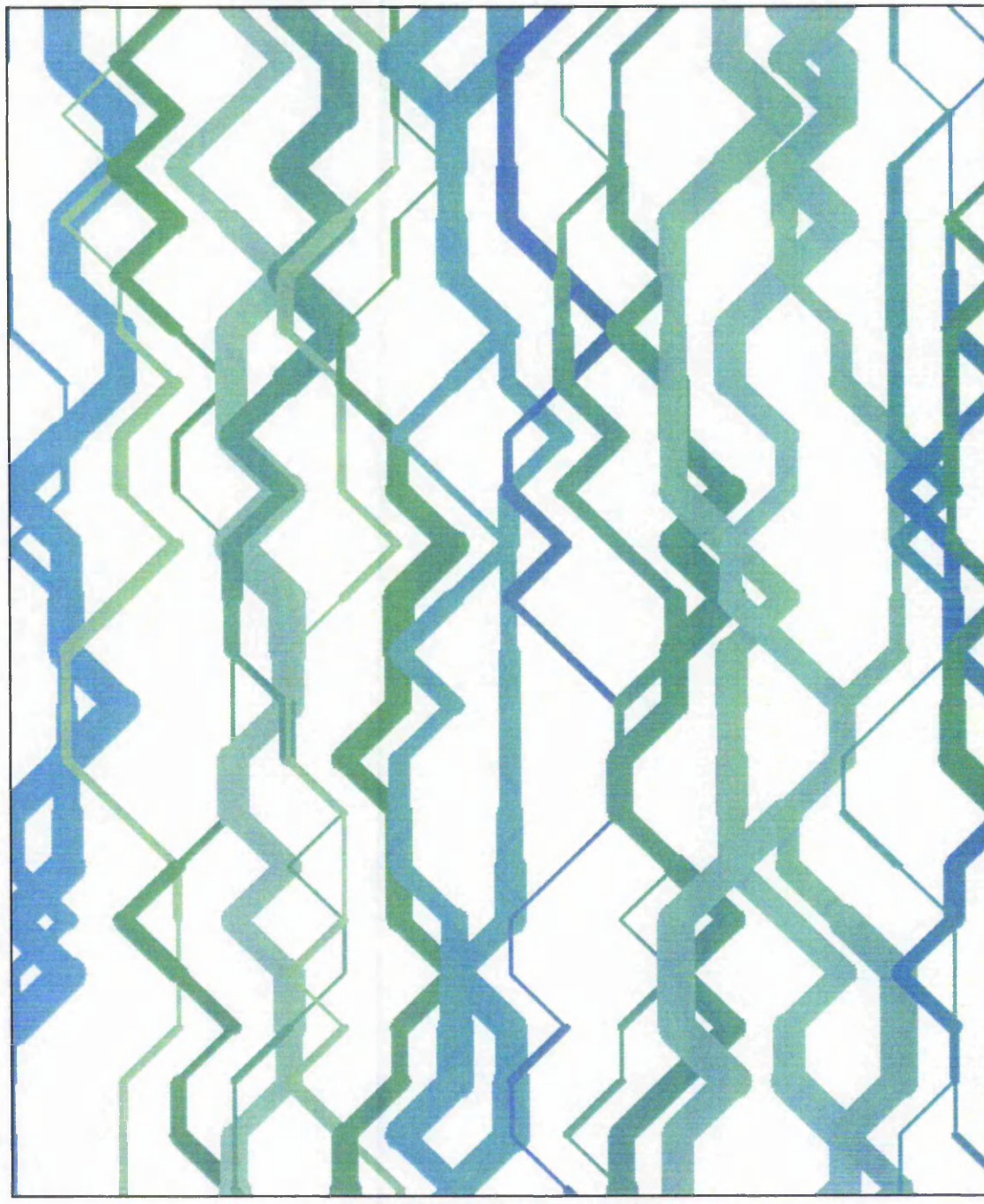


Figure 5-M: Squiggles (Touching)

5.5.2.6.1 Design Criteria

This progressive pattern type was inspired by the results of the previous one. In this case, parameters have been relaxed in order to allow the crossing of lines and the lines themselves are of random width, with a larger scale unit. Rather than each segment of the line being given a different colour, the line colour is selected and maintained to the

bottom of the drawing area. Extra irregularity is given through the use of the overlapping lines and variable line width. The movement towards the large scale end of the scale continuum adds femininity. Angularity is increased through the longer straight line lengths.

5.5.2.6.2 Predetermined Features (Hardcoding)

The columns are 10mm apart. The vertical height of the line unit is 10mm. For diagonal lines, the horizontal distance from the central vertical column axis is 10mm, to either the left or right.

5.5.2.6.3 User Determined Features

Colour range is selected from the menu.

5.5.2.6.4 Program Procedure

1. SET background colour to be the tenth colour in the colour range selected by the user.
2. LOCATE a vertical guide to restrict the movement of the line, initially against the left hand edge of the canvas and subsequently 10mm to the right of the previous one.
3. LOCATE two vertical boundaries, a left boundary 10mm to the left of the vertical guide, and a right boundary 10mm to the right of the vertical guide.
4. SET colour = RANDOM selection of any of the first nine colours in the range.
5. Draw the first line in the column as follows:
   - SET line direction = RANDOM selection of 45° left, 45° right, vertical
   - SET line width = RANDOM selection of 1, 2, 3, 4, 5, 6, 7 mm
   - SET start point = top edge of canvas, in line with vertical guide.
   - SET end point = 3mm vertically below start point
   - DRAW & COLOUR line.
6. Draw the rest of the lines in the column as follows:
   - SET line direction = RANDOM selection of 45° left, 45° right, vertical
     EXCEPT:
     IF the end point of the previous line intersects with the right vertical boundary, omit the option of 45° right
     IF the end point of the previous line intersects with the left vertical boundary, omit the option of 45° left
   - SET line width = RANDOMLY select from same, 1mm wider or 1mm narrower than previous line.
     EXCEPT:
     IF the previous line was the maximum width, omit wider option.
     IF the previous line was the minimum width, omit narrower option.
   - SET start point = end point of previous line.
   - SET end point = 10mm vertically below start point.

- DRAW and COLOUR the line.

7. REPEAT step 6 until the bottom of the drawing area is reached.
8. START next column by REPEATING procedure from step 2.
9. FINISH when the vertical guide position extends beyond the right hand edge of the drawing area.

5.5.2.6.5 Observations

This pattern type appears less regular and stimulates more visual interest for me than the previous one. The larger motifs and overlapping lines create interesting negative spaces in the background, rather than the slightly irregular stripes illustrated in Figure 5-K. For me, this pattern type combines the visual interest of the de-restricted example in Figure 5-L, with the adherence to the cohesion conventions displayed in Figure 5-K. The overall effect of the pattern type is quite disordered; it is not really possible to look for underlying patterns in the way it has been with some of the previous pattern types. But at the same time, the pattern is cohesive; there are no significantly large empty areas and no particular areas which appear more tangled than others. The restricting parameters are functioning correctly without broadcasting their existence.

The increased angularity anticipated by the longer unit line lengths has not occurred. By default, the line drawing procedures in *Visual C++* gives semicircular, rather than flat ends to the lines, hence many of the angles caused by direction changes appear as bends rather than sharp corners. While some angularity remains, the geometric feel is lessened by the irregular shapes formed in the negative spaces and the variation in line width. This pattern type takes a further step towards the organic, though it is still a distance away from the organic extreme. Combining all these factors with the disordered effect described above leads me to consider this pattern type to be fairly close to the feminine end of the gender continuum.

5.5.2.6.6 Recommendations

The features of this pattern type could be incorporated into those of Pattern Type 5 by providing extra user options. A maximum overlap parameter could be added to allow the user to vary the degree of disorder apparent in the patterns.

5.5.2.7 Pattern Type 7: Stems and Leaves

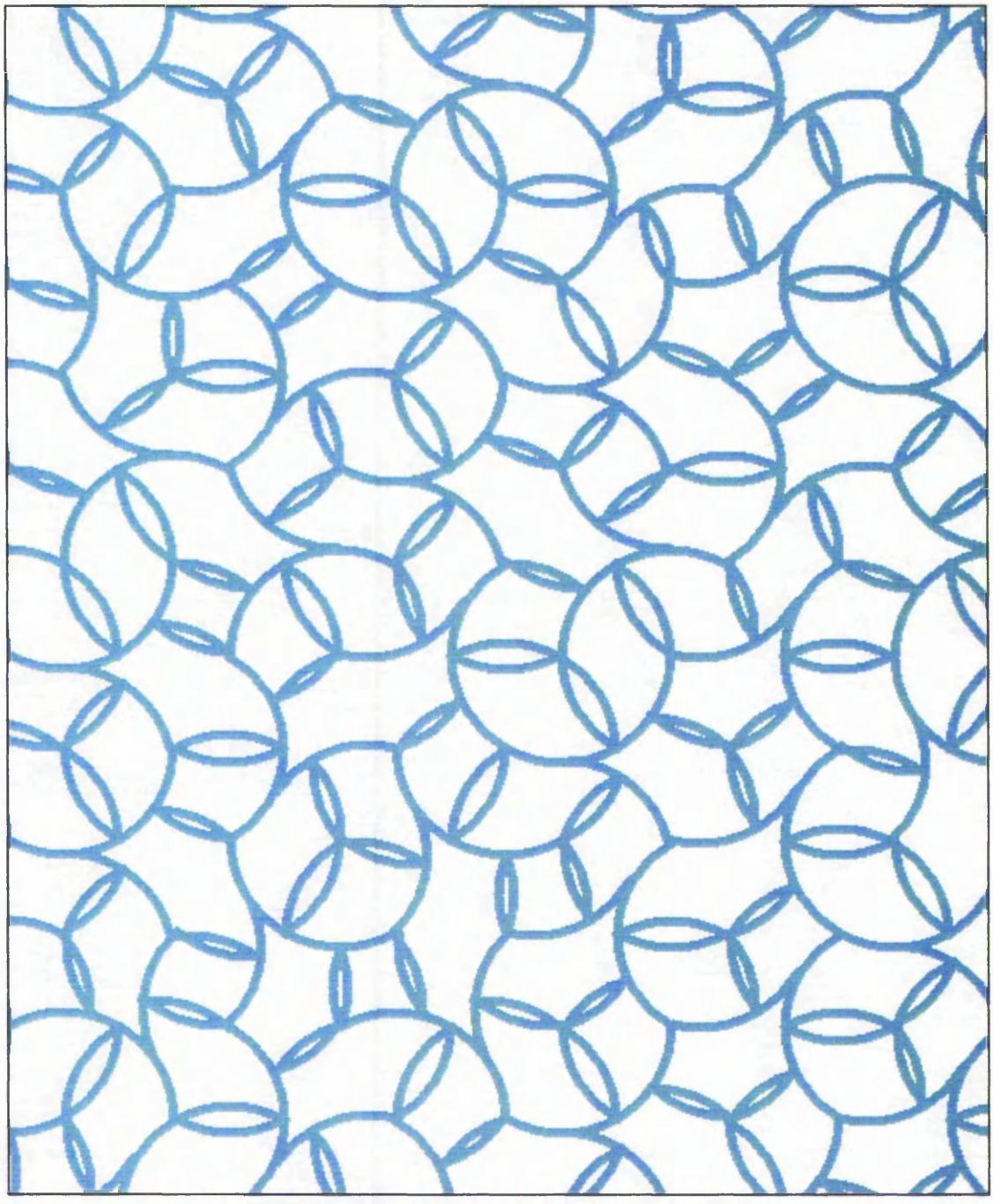


Figure 5-N: Stems & Leaves (with no variations)

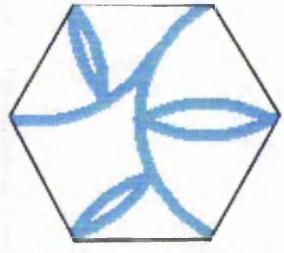


Figure 5-O: Stems & Leaves, single motif

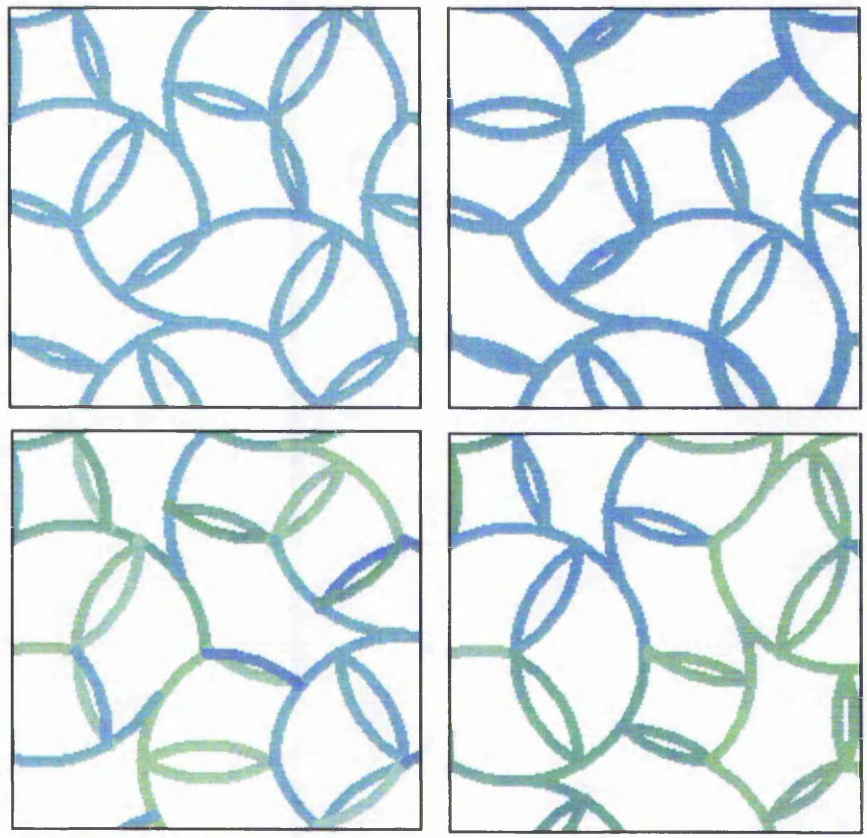


Figure 5-P: Stems & Leaves Line Variation: Clockwise from top left, Line Shading, Line Width, Line Colour and Gradient Shading,

5.5.2.7.1 Design Criteria

The adopted method of working with *Visual C++* tends to give the lines and motifs a geometric quality which limits the ability to create organic qualities in the patterns. This pattern type has a grid-based construction, and was inspired by the semi-manual design illustrated in Figure 4-FF, drawn on a hexagonal grid. A single motif with linking points at each corner, (see Figure 5-O), is rotated in 60°units, randomly across the grid. In choosing to attempt to reproduce this pattern, it was intended that the organic qualities of the meandering lines, and visual resemblance to stems and leaves would invoke an organic feel into this pattern type. Four extra options also give further variation in this pattern type, each of which is demonstrated in Figure 5-P.

5.5.2.7.2 Predetermined Features (Hard-coding)

Each of the six rotations is constructed from eight arcs of varying length, to give the feel of a stem with two leaves, as shown above. Each rotation is treated as a separate motif, and its construction hard-coded into the program.

5.5.2.7.3 User Determined Features

The user can choose the colour range. Other available options, shown in Figure 5-P, are line shading, which gives each arc an outline in a different colour; variable line width, from 2 to 3mm in 0.1 mm increments; variable line colour, in which each arc is randomly coloured; and gradient shading in which each motif is randomly coloured. The first two options may be combined with either of the last two.

5.5.2.7.4 Program Procedure

1. SET background colour to be the tenth colour in the colour range selected by the user.
2. LOCATE a vertical guide to position the column, initially 30mm to the left of the left hand edge of the canvas (off the canvas, to ensure continuity) and subsequently 30mm to the right of the previous one.
3. LOCATE first motif in column to be positioned 17.3mm above top edge of canvas for continuity. For each subsequent column alternate start position between 17.3 mm above and level with the top edge of the canvas, to give honeycomb effect, rather than block effect.
4. SET motif rotation = RANDOM selection of 0°, 60°, 120°, 180°, 240°, 300°
5. Draw arc as follows:
   - SET line colour = second colour in the chosen colour range.
     EXCEPT:
     IF line colour option selected: RANDOM selection of first nine colours in range.
     IF gradient shading selected: As for line colour for first arc in motif, same as last for subsequent arcs in motif.
   - IF line shading option selected:
     SET outline colour = third colour in the chosen colour range.
     EXCEPT:
     IF gradient shading selected:
     SET outline colour = RANDOM selection from first nine colours
     EXCEPT:
     IF outline colour = line colour, change outline colour incrementally.
   - IF line width option selected:
     SET line width = RANDOM selection of 2, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 3mm
   - DRAW & COLOUR the arc according to the hard-coded parameters
6. REPEAT step 5 for all eight arcs in the motif
7. LOCATE next motif position = 34.6mm below the last
8. REPEAT steps 4-6 until the bottom of the drawing area is reached.
9. START next column by REPEATING procedure from step 2.
10. FINISH when the vertical guide position extends beyond the right hand edge of the drawing area.

5.5.2.7.5 Observations

This pattern type varies considerably depending on the options chosen. At its simplest (see Figure 5-N) the pattern shows curved lines with a somewhat stylised leaf and stem effect which adds to the organic feel. However, the simplicity of lines, and lack of variation in line width or colour, give it a clean, rational feel, and the use of arcs to construct the design also gives it an air of geometry, which is compounded by the fact that it is possible for motifs to link in a particular formation in which a complete circle is formed. When these circles do occur they form a quickly identifiable visual feature. In Figure 5-N, this effect can be partially seen towards the top of the right hand edge of the pattern, where despite the cropping, one's eye is drawn to a near complete circle containing three leaf motifs which form a pattern often constructed by school children with a pair of compasses. An entire circle can be seen towards the top left of the example illustrated in Figure 5-R. More commonly, nearly complete circles appear, to which the eye is similarly drawn.

In Figure 5-Q, the variable line width, variable line colour and outline options have been chosen together with a colour range with a dark ground. The overall feel of the pattern is less regular and less geometric. In my view, the variable line width lends itself to a lack of cohesion at the intersections of the arcs, and the unity of the motifs is lost through the individual colouring of the arcs and their outlines, particularly as some combinations of line and outline colour are much more prominent than others. While the darker ground and richer colours give a less clinical feel to the pattern.

Figure 5-R gives another variation in which the gradient shading option, (to randomly colour whole motifs rather than arcs), and the line shading option, (to give randomly coloured outlines), have been selected. Colouring whole motifs and giving consistency to the line width results in an example which appears to me delicate and cohesive without the clinical feel of the first example, or the visual jarring of the second.

This pattern type follows the cohesion conventions, regardless of the options picked. Its grid-based structure ensures the surface is covered evenly, while the use of a hexagonal linking motif prevents an obvious grid structure being visible to the eye. Some options give a less cohesive feel than others, but the small scale of the pattern lends itself to giving a feeling of continuity over a wider area. The pattern type has established the use of stylised organic imagery which moves the visual qualities away from the geometric, though, as discussed above some geometric qualities remain. As the pattern is entirely constructed from arcs it is necessarily at the curved extreme of the angular to curved continuum. The use of one motif, albeit in six rotations, gives

some feelings of regularity, particularly as the shapes made by negative spaces are of similar sizes and shapes. What the pattern type does not display is an easily quantifiable measure of regularity, demonstrable in visual effects such as stripes. Though the masculine and feminine indicators can be varied for this pattern type, its overall location on the gender feature continuum is considerably towards the feminine extreme.

5.5.2.7.6 Recommendations

This routine could be adapted to allow the user to pick line width, and shade width, and to vary the scale of the motif. The variable line width seems superfluous and could be removed. Further development could allow the user to draw their own motifs, with linking points indicated on a hexagonal drawing area. If motifs were drawn by using a mouse or computer stylus, a much more organic and less geometric feel could be achieved. This technique would require the software to store the user's line movements as a series of very short straight lines and may be prohibitive in terms of computer memory. It would also require a transformation procedure to be constructed through which the motif could be rotated.

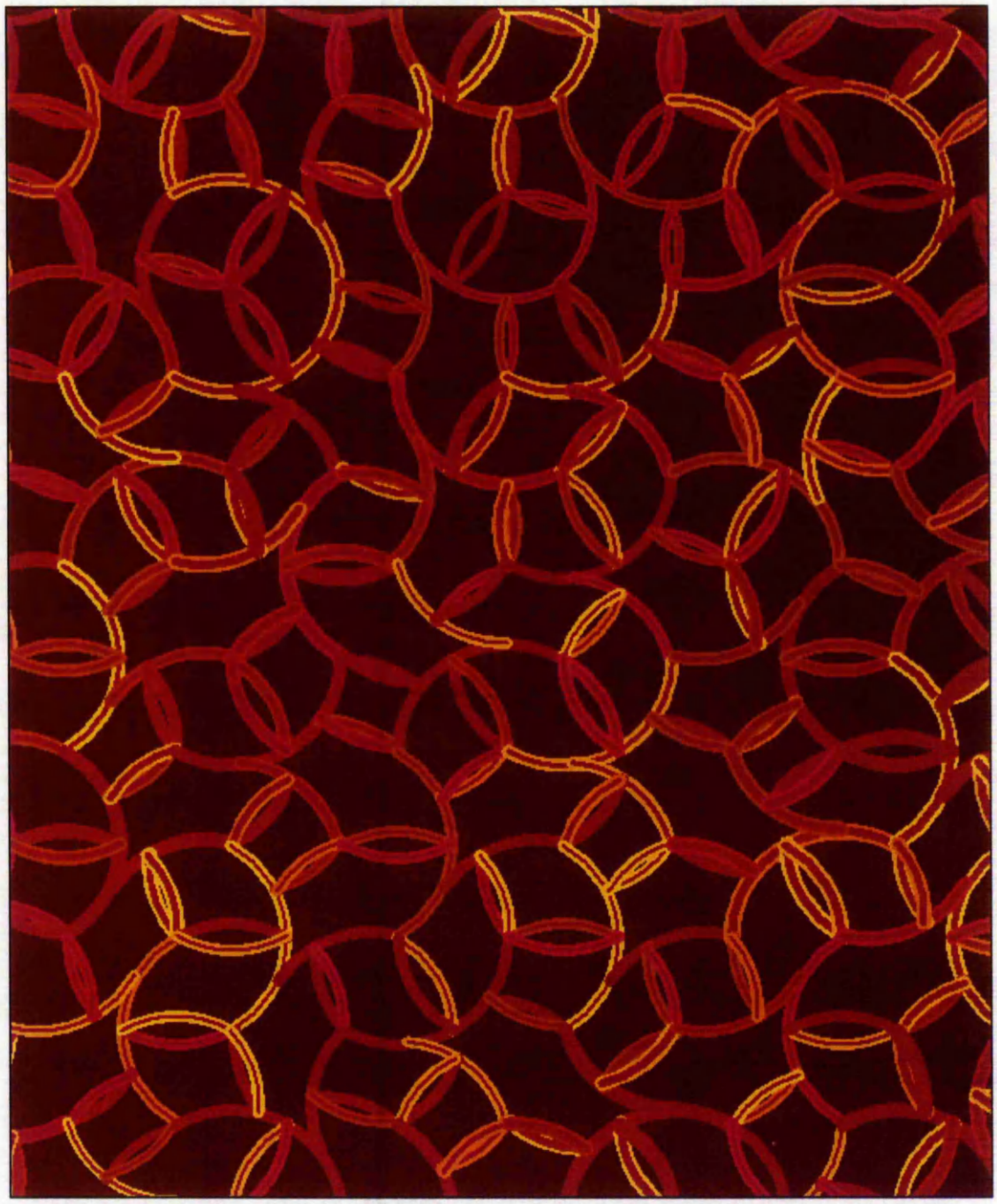


Figure 5-Q: Stems & Leaves with line shading, variable line width & line colour options

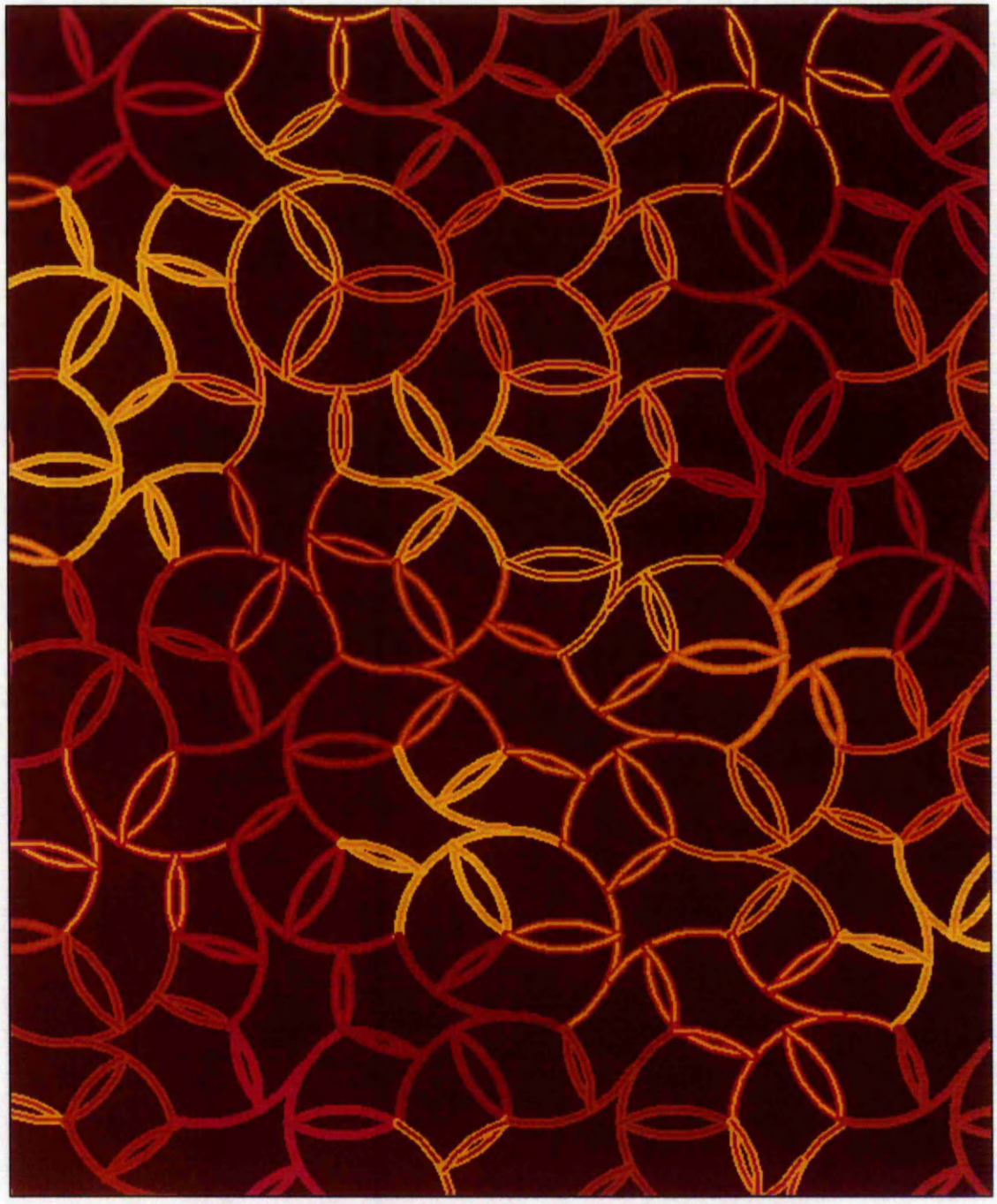


Figure 5-R: Stems & Leaves (with Line and Gradient Shading)

5.5.2.8 Pattern Type 8: Stems & Berries (Block)

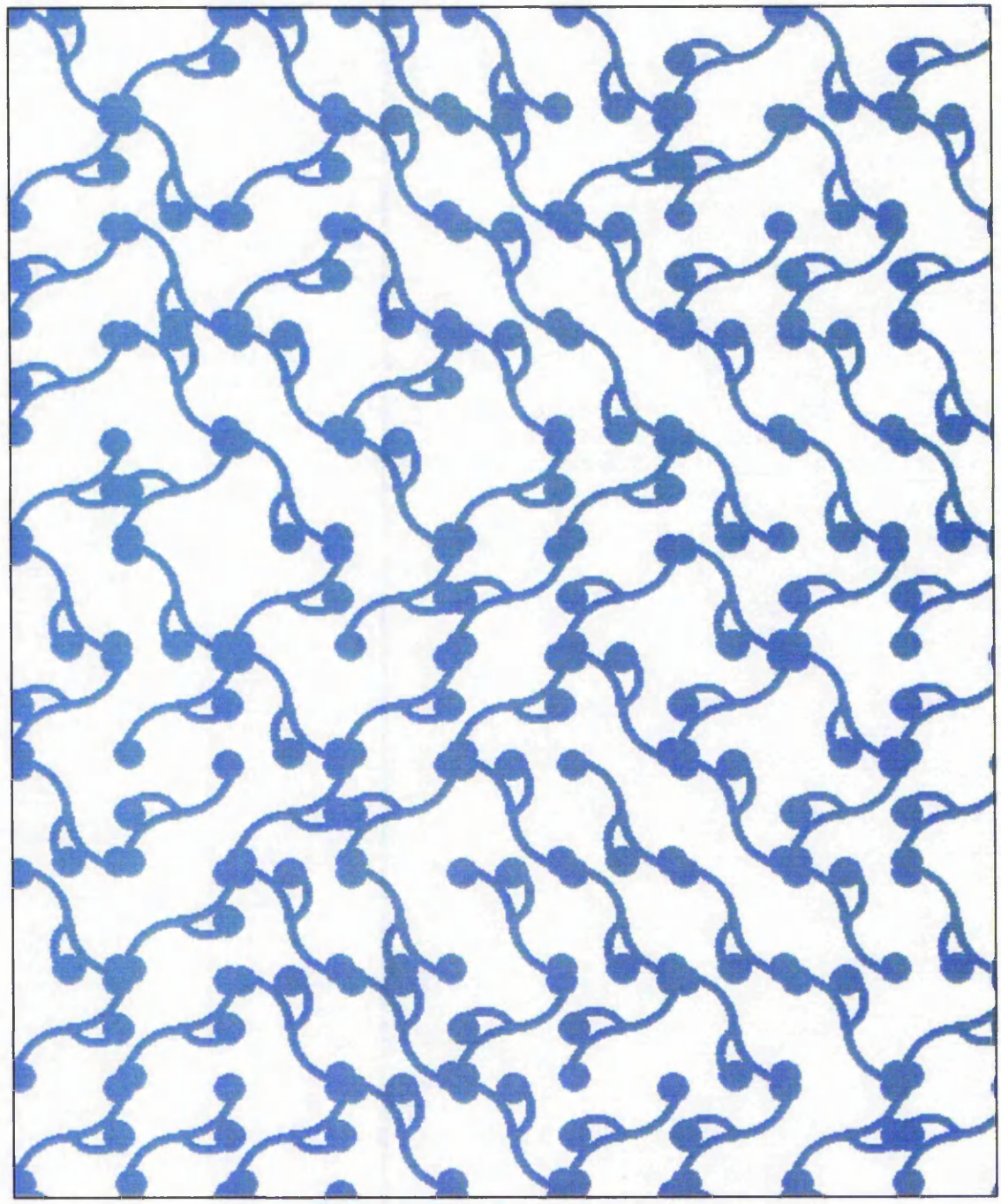


Figure 5-S: Stems & Berries (block) with no variations

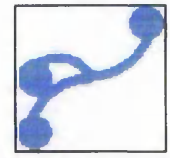


Figure 5-T: Stems & Berries, Single Motif

5.5.2.8.1 Design Criteria

This pattern type is grid-based, using a square grid. A single motif with linking points at two diametrically opposed corners, (see Figure 5-T) is rotated through 90° units randomly across the grid. The end of each stem contains a circle, which provides the linking point. This causes clusters of circles to be drawn overlapping each other at the cross sections of the grid. The motivation for this pattern type was to investigate the use of a square grid with a linking motif displaying no symmetry, and establish the resultant visibility of the grid. This investigation continues into Pattern Type 9 where the same motif is used in a half-drop structure, rather than a block. This pattern type was also inspired by a continuing desire from the last pattern type to construct stylised organic forms from geometric shapes.

5.5.2.8.2 Predetermined Features (Hard-coding)

Four variations of the motif, at rotations of 0°, 90°, 180° and 270° are hard-coded into the program logic by definition of the arcs and circles which constitute them. Each comprises three arcs of varying length and three circles. If the user does not specify variable colour, the arc and circle fill colour will be the first in the colour range, and the outline (if specified) will be in the fifth.

5.5.2.8.3 User Determined Features

The user can choose the colour range. Other options are line shading, giving each arc and circle an outline; variable line width, from 1.5 to 2.5mm in 0.1mm increments; and variable line colour, which also alters the outline colour, if chosen, to be a colour between 3 and 5 positions in the colour range away from the arc colour. Gradient shading has no effect for this pattern type.

5.5.2.8.4 Program Procedure

1. SET background colour to be the tenth colour in the colour range selected by the user.
2. LOCATE a vertical guide to position the column, initially aligned with the left hand edge of the canvas, and subsequently 20mm to the right of the previous one.
3. LOCATE the top of the first motif in column to be aligned with the top edge of the canvas.
4. SET motif rotation = RANDOM selection of 0°, 90°, 180°, 270°
5. Draw the arc/circle as follows:
   - SET line colour = first colour in the chosen colour range.
     EXCEPT:
     IF line colour option selected: RANDOM selection of first nine colours in range.

- IF line shading option selected:
  SET outline colour = fifth colour in the chosen colour range.
  EXCEPT: IF line colour option also selected: RANDOM selection of first nine colours in range, ensuring it is different to the line colour.
- IF line width option selected:
  SET line width = RANDOM selection of 1.5, 1.6, 1.7, 1.8, 1.9, 2, 2.1, 2.2, 2.3, 2.4, 2.5mm
- DRAW & COLOUR the arc or circle according to the hard-coded parameters

6. REPEAT step 5 for all arcs and circles in the motif
7. LOCATE next motif position = 20mm below the last
8. REPEAT steps 4-6 until the bottom of the drawing area is reached.
9. START next column by REPEATING procedure from step 2.
10. FINISH when the vertical guide position extends beyond the right hand edge of the drawing area.

5.5.2.8.5 Observations

Once again, the variations and colour ranges chosen for this pattern cause the resultant visual effects to vary dramatically. While no obvious geometrical shapes, of the type seen in Pattern Type 7, are evident in this pattern type, the perfectly circular berries and stems constructed of two arcs do give a regular and geometric feel, though this is slightly lessened by the over-placement of the circles at the intersection points of the grid. The block structure is not apparent, but diagonals do appear, due to the use of a motif that diagonally intersects the square unit. The irregular nature of the rotations leads to almost a herringbone pattern in places on the pattern. When viewed over a larger area the square grid does become visible and the overall effect looks to me like an enlarged sample of knitting, with some stitches dropped, rather than the desired stems and berries the motif was trying to illustrate.

Comparing Figure 5-S with Figure 5-V shows how widely this pattern type can vary with the selection of variations. Figure 5-V displays variable arc and circle colour, variable arc width and outlines of varying colours on circles and arcs. Figure 5-S displays no variations. While the first of these two images has a slight organic feel, the motifs being reminiscent to me of tadpoles or spermatozoa, I feel the latter displays the most organic qualities of all the examples shown. The variable line width and use of colour gives a less well defined look to the motifs. In some cases, there are parts of the motif which merge into each other. For me, the overall feel of Figure 5-V, admittedly enhanced by the colour range, is of a fishing net, caught up with small creatures and seaweed. As highlighted above however, the larger surface the pattern is drawn over, the more obvious the grid structure becomes.

The choice of colour in this pattern type makes a tremendous difference, as the negative spaces between the motifs become much more visible when a darker ground is used. Figure 5-U illustrates this by showing the first colour range on the left and a dark ground range on the right, both with line shading. In my view, the shapes between the motifs form an integral part of the design in the right-hand example, and give a more cohesive feel than the left-hand side on the white ground. In the right hand example the balance of the foreground and background moves the pattern features away from the geometric and towards the organic.

As in the previous pattern type, the cohesion conventions are complied with by virtue of the grid-based design with linking motifs. However, while the arcs and circles should still imply positioning at the curved extreme of the curved to angular polarity, the diagonals formed through linking the motifs do give an angular feel. Similarly, the stems and berries are less convincing as stylised organic forms than the stems and leaves. Hence the pattern type, while being positioned on the feminine side of the gendered feature continuum, is not as close to its extreme as the previous one.

5.5.2.8.6 Recommendations

This routine could be adapted to allow the user to pick line width, and shade width, and to vary the scale of the motif. Another option, which would allow the outline colour to be selected and fixed while the fill colour varies, may also produce interesting results. The gradient shading option could be introduced to vary the motif colour as a whole rather than by individual arc. Instead of rotating one motif, four or more separate motifs could be hard coded and selected randomly for each position. As with the previous pattern type, allowing the user to draw their own motifs would increase the design example possibilities.

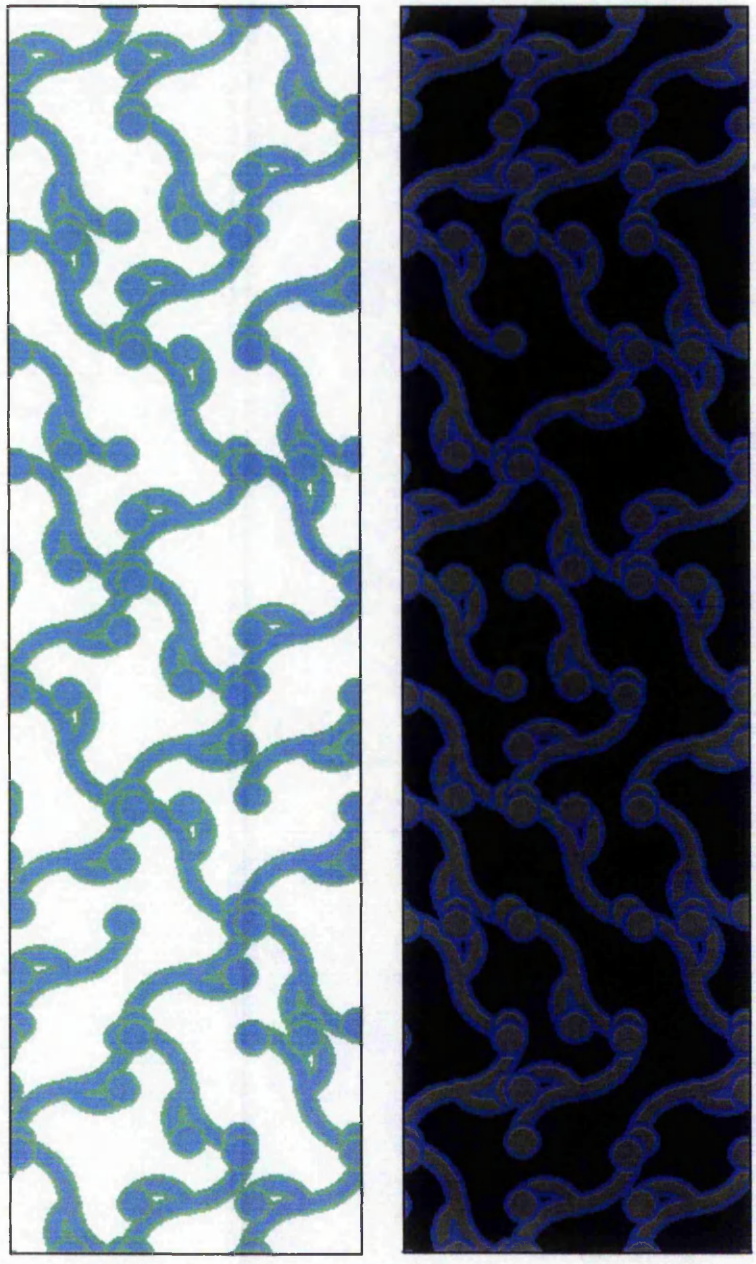


Figure 5-U: Stems & Berries, Comparison of Grounds

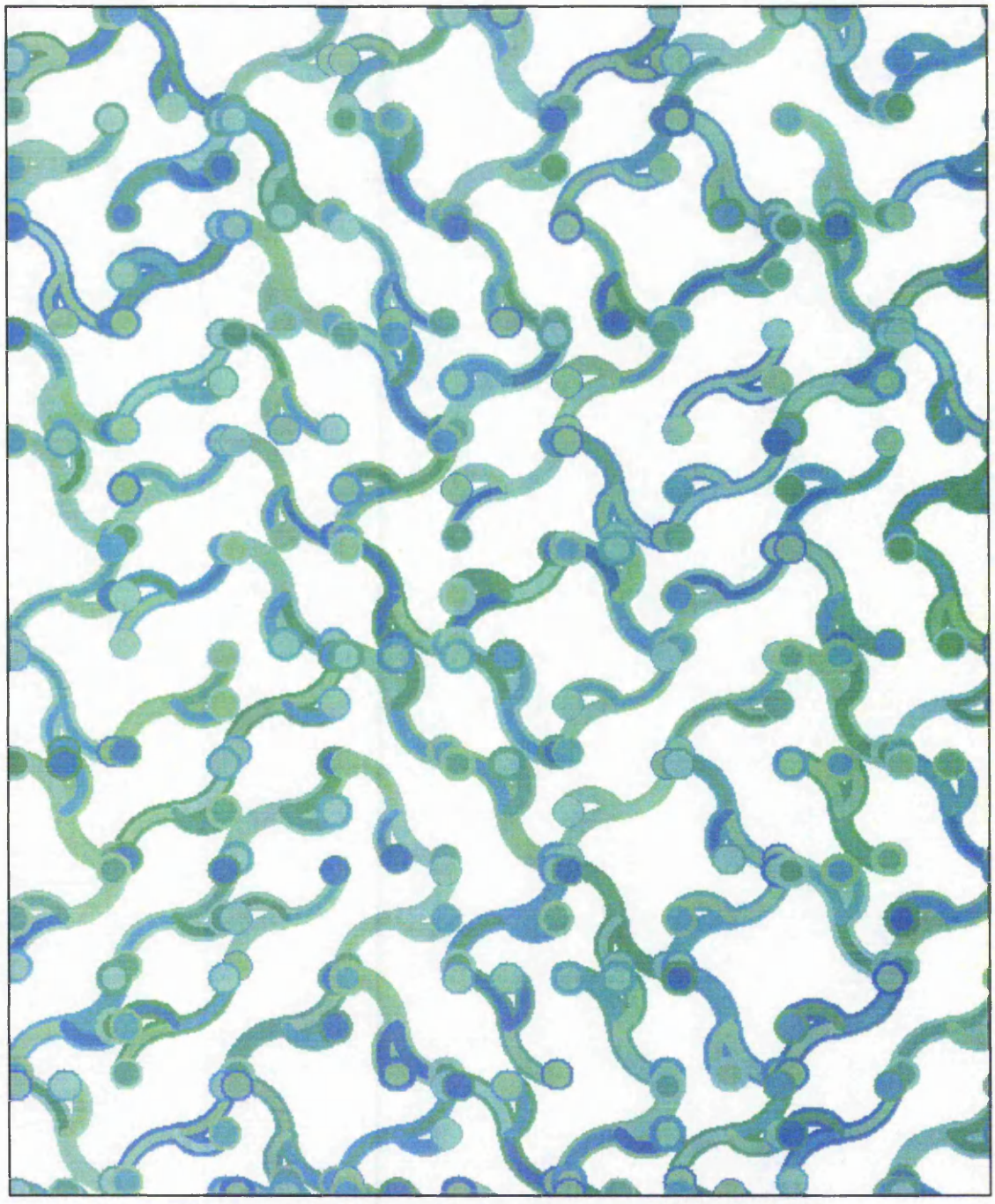


Figure 5-V: Stems & Berries (block) with all variations applied

5.5.2.9 Pattern Type 9: Stems & Berries (Offset)

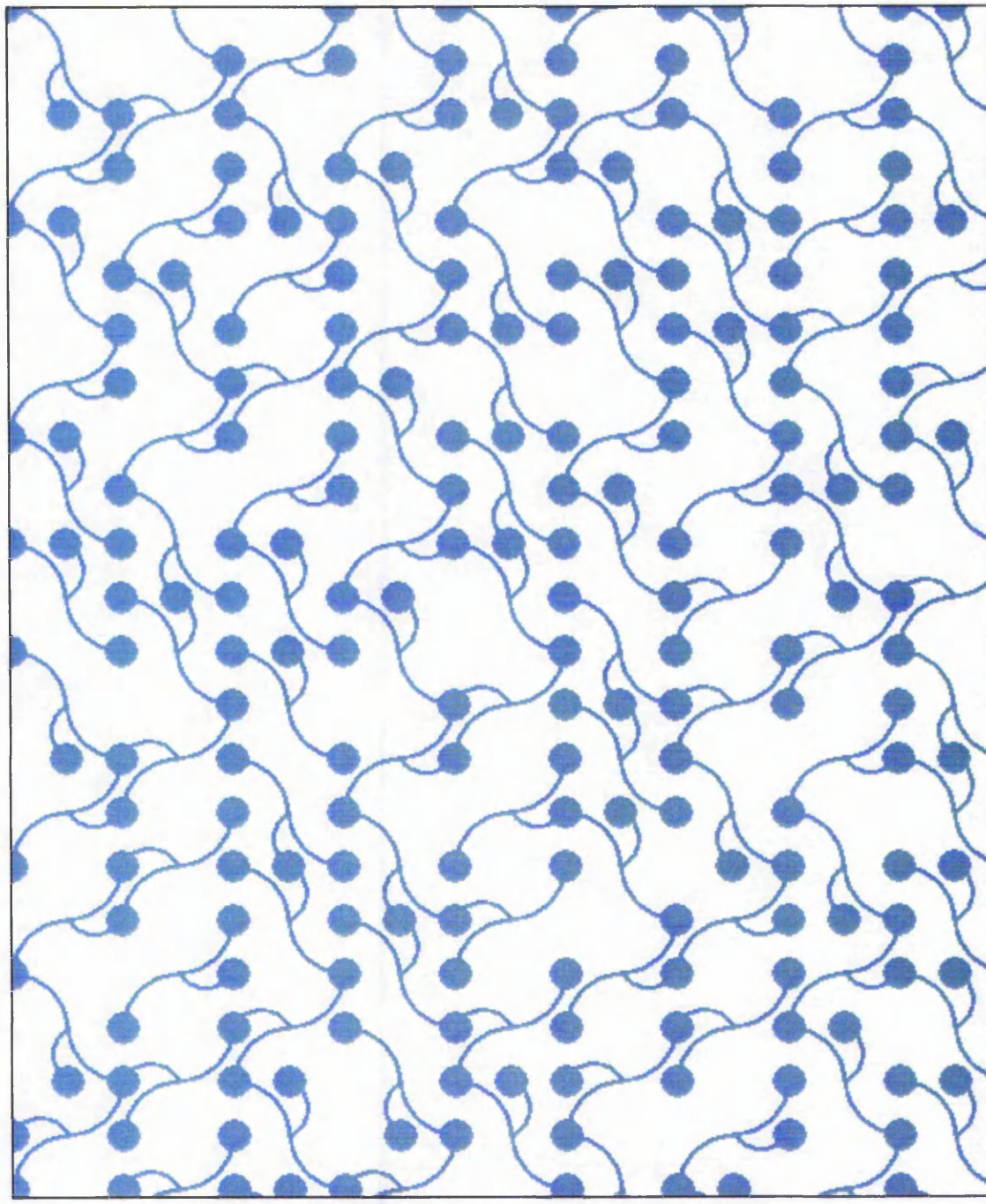


Figure 5-W: Stems & Berries (Offset) with no variations

5.5.2.9.1 Design Criteria

This pattern type was conceived using the same motivation as the previous one, and uses the same single motif rotated on a square grid. However, as can be seen in Figure 5-T the motif has a linking point in the centre of the left hand edge of the square unit, which wasn't utilised in the Pattern Type 8. In this case the grid is

constructed as a half-drop, rather than a block structure, thereby utilising the extra linking point. As the default line width was of a thickness that the circles touched the arcs, a thinner line width was used in this pattern type.

5.5.2.9.2 Predetermined Features (Hard-coding)

Four variations of the motif, each at a rotation of 90° to each other, have their geometric shapes hard coded into the program. Each comprises three arcs of varying length and three circles. If the user does not specify variable colour, the arc and circle fill colour will be the first in the colour range, and the outline (if specified) will be in the fifth. The circles are always shown with a 0.5mm outline, regardless of the line shading option.

5.5.2.9.3 User Determined Features

The user can choose the colour range. The line shading option gives each arc and circle a border of 0.6mm. The variable line width option allows each arc to be any width from 1.2 to 1.6mm in 0.1mm increments. The variable line colour option also alters the outline colour, if chosen, to be a colour between two and four positions in the colour range away from the arc colour. Gradient shading acts in the same manner as line shading, but the entire motif retains the same colour choice, rather than the individual line.

5.5.2.9.4 Program Procedure

This program procedure is identical to the previous one, with the exception that the motifs in alternate columns are vertically offset by 10mm to give the half-drop effect.

5.5.2.9.5 Observations

A half-drop structure is often used in repeating pattern design to disguise the grid structure on which it is based. In this example, where the same motif as the previous pattern type has been randomly rotated on a half-drop grid, rather than a block one, the opposite appears to be true. In this case, the more precise positioning of the circles acting as linking points has removed the clustered effect of several circles being slightly offset from each other, which is displayed in Figure 5-S. As geometrically precise circles are now placed at the intersections of the grid, my eye is drawn to horizontal and vertical lines of circles. The chevron effects displayed in Pattern Type 8 are not displayed here.

The combination of the rigid placement of the circles and the curving lines gives an interesting juxtaposition. The single colour of the example shown in Figure 5-W provides a unity to the pattern as a whole. Other than the linear positioning of the circles, there are no easily identifiable sections of the pattern which one can attempt to locate in other areas. Once again, a clinical organic feel is given, with the thinner arc width adding to the resemblance of the motifs to spermatozoa.

Figure 5-X shows an example of the pattern type in which the gradient shading option, (to colours whole motifs randomly), has been applied. The extra colour in the design helps the circles in the pattern to remind me of LED lights on electronic equipment. Despite the curved arcs which link the circles, the whole pattern reminds me in some ways of a circuit board drawing.

As with the previous grid-based pattern types, this one readily adheres to the cohesion conventions, and also as with the other types, the gendered qualities it displays vary significantly dependent on the variations selected. However, the precise drawing of the intersecting circles and the thinner arc width prevent it from looking as organic as the example of Pattern Type 8 in Figure 5-V.

5.5.2.9.6 Recommendations

This pattern type could be incorporated with Pattern Type 8. The user could be given options of block or half drop structure. The grid options could be increased to allow further structures, such as quarter-drop or bricks. Extra options for line width selection and a facility for user-drawn motifs to be processed could also be added.

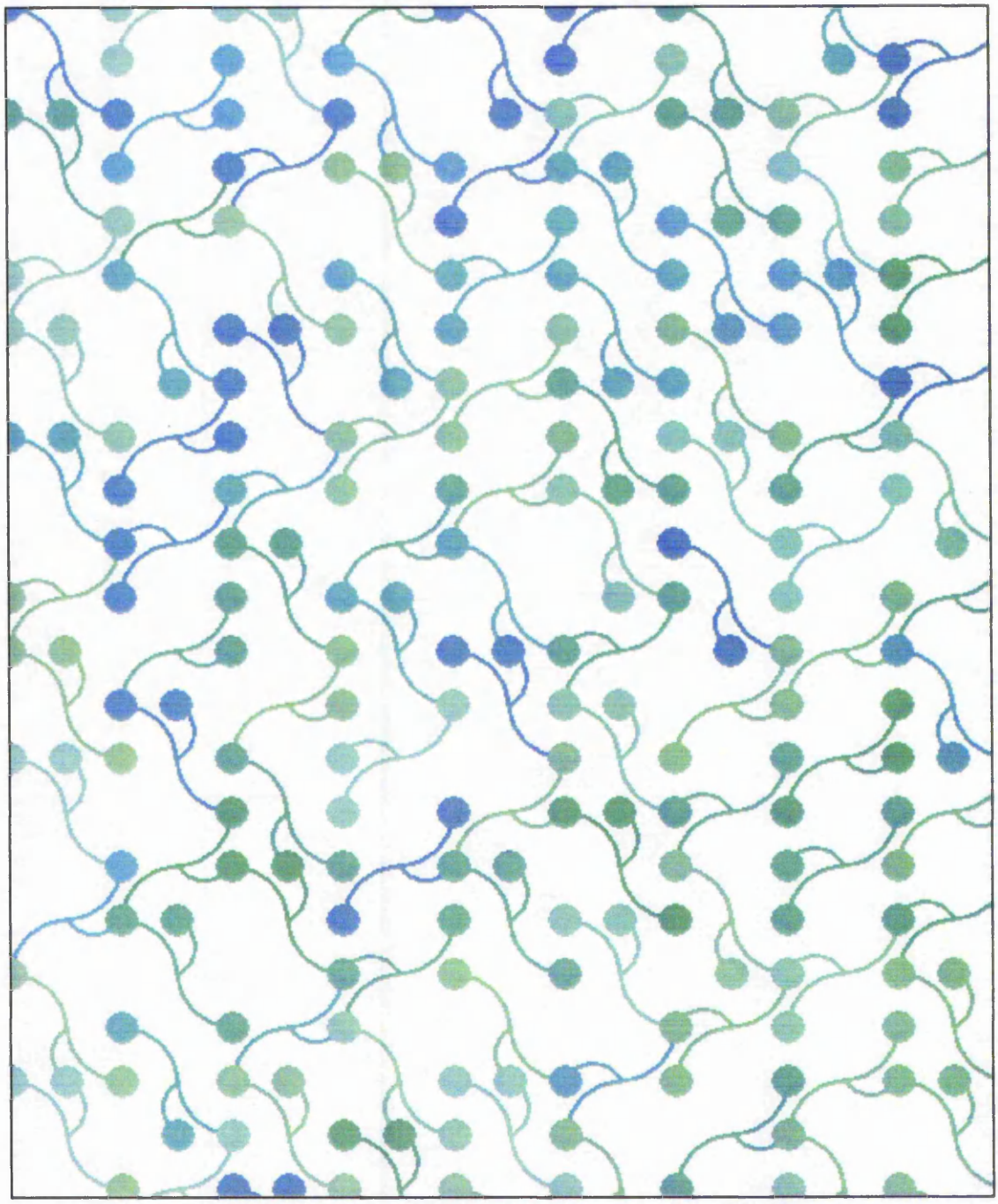


Figure 5-X: Stems & Berries (Offset) with Gradient Shading

5.5.2.10 Pattern Type 10: Diamonds (Unrestrained)

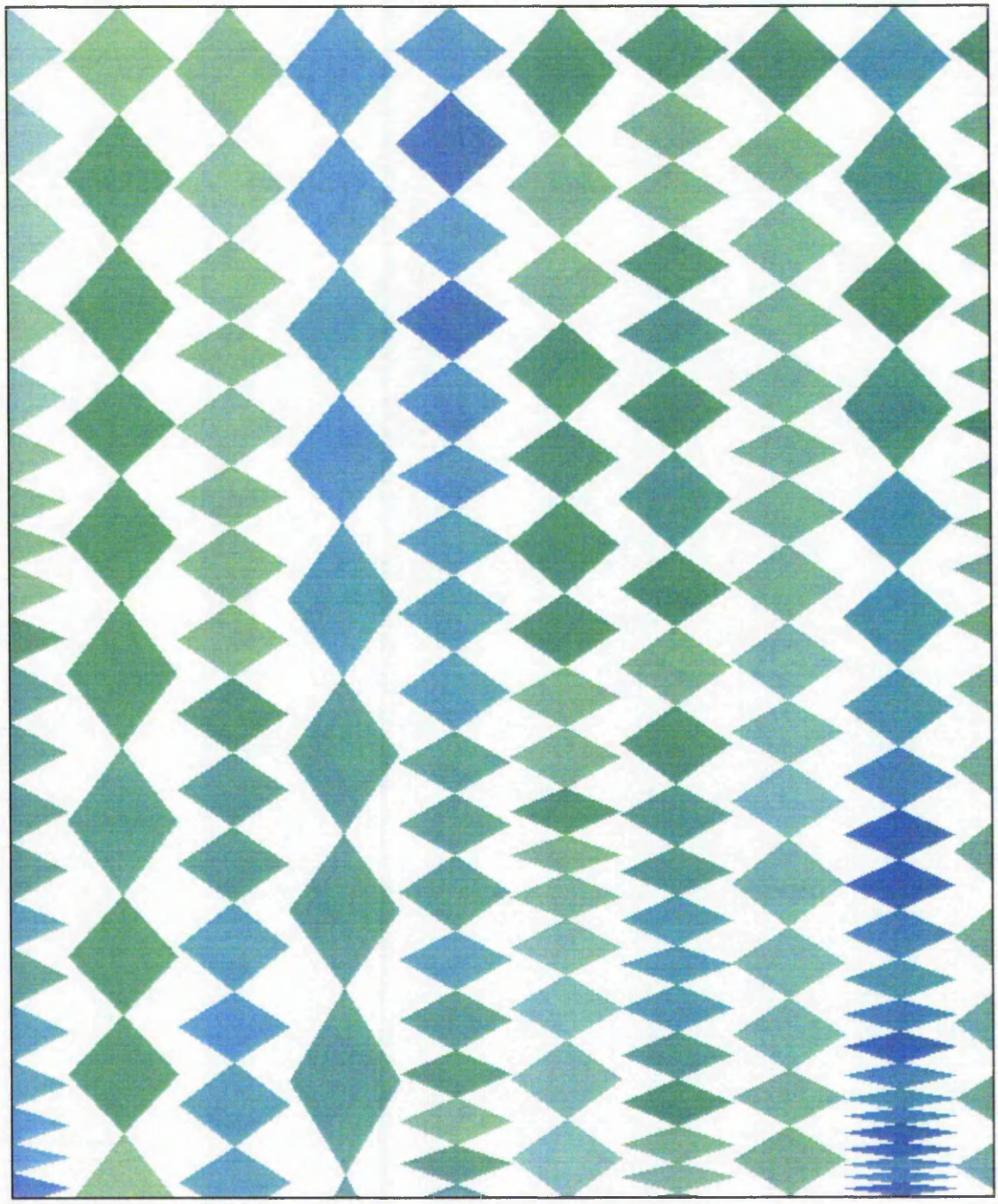


Figure 5-Y: Diamonds (Unrestrained)

5.5.2.10.1 Design Criteria

This progressive design is an extension of Pattern Type 3, Diamonds (Columnar), with reference back to the degradation encountered in some of the semi-manual experiments. In this type, instead of incrementally allowing the diamond sizes to change between two height boundaries, the height of any diamond can become twenty

percent taller or shorter than its predecessor, (or stay the same). There is no maximum height restriction. The original intention was to have no minimum height restriction either, though this caused the software to become unstable on longer lengths when very small sizes were encountered.

5.5.2.10.2 Predetermined Features (Hardcoding)

The minimum height of any diamond is 0.2mm minimum. Every diamond is 20mm wide. The distance between the columns is 20mm.

5.5.2.10.3 User Determined Features

The user can choose the colour range.

5.5.2.10.4 Program Procedure

The same procedure as Diamonds (Columnar) in 5.5.2.3.4, with the exception that the height is chosen from three possible options: stay the same, increase twenty percent, or decrease twenty percent. If the height is 0.2mm, the decrease option is ignored.

5.5.2.10.5 Observations

Most of the same observations are true as for Diamonds (Columnar), though the twenty percent changes in size cause a wider variety of sizes to be displayed, and removes some of the control invoked through the selection of incremental changes. Unfortunately, as may have been expected, the pattern has a tendency to degrade as the surface becomes longer. Figure 5-Z show an example of degradation after the pattern has reached a length of 400 mm. Column 5 shows the effect of continual shrinkages in height, which after a time become irrevocable by increases in height. The diamonds degrade into lines of colour which, as remarked during similar examples in Chapter 4, provides an interesting visual feature. The cohesion conventions are clearly not applied in this pattern type, though the interesting visual effects could be explored more fully over a longer length surface.

5.5.2.10.6 Recommendations

If this pattern type were to be explored further, an increase in the minimum height of the diamond would be required to prevent degradation, and a maximum height would be required. However, if this were carried out, the pattern type would become essentially the same as Pattern Type 3.

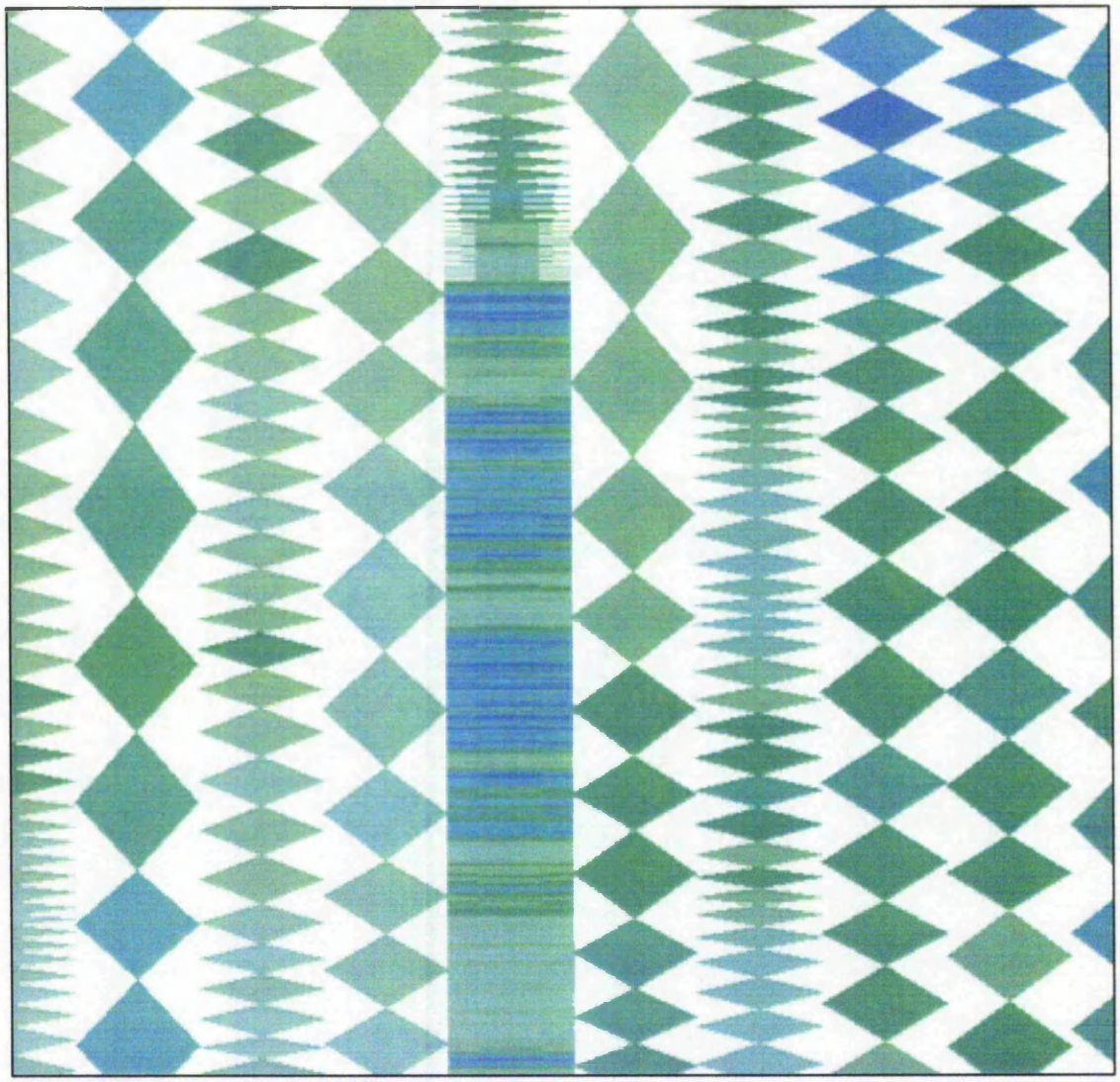


Figure 5-Z: Diamonds (Unrestrained) Degradation after 0.4 metres

5.5.2.11 Pattern Type 11: Squiggles (Less Restrained)

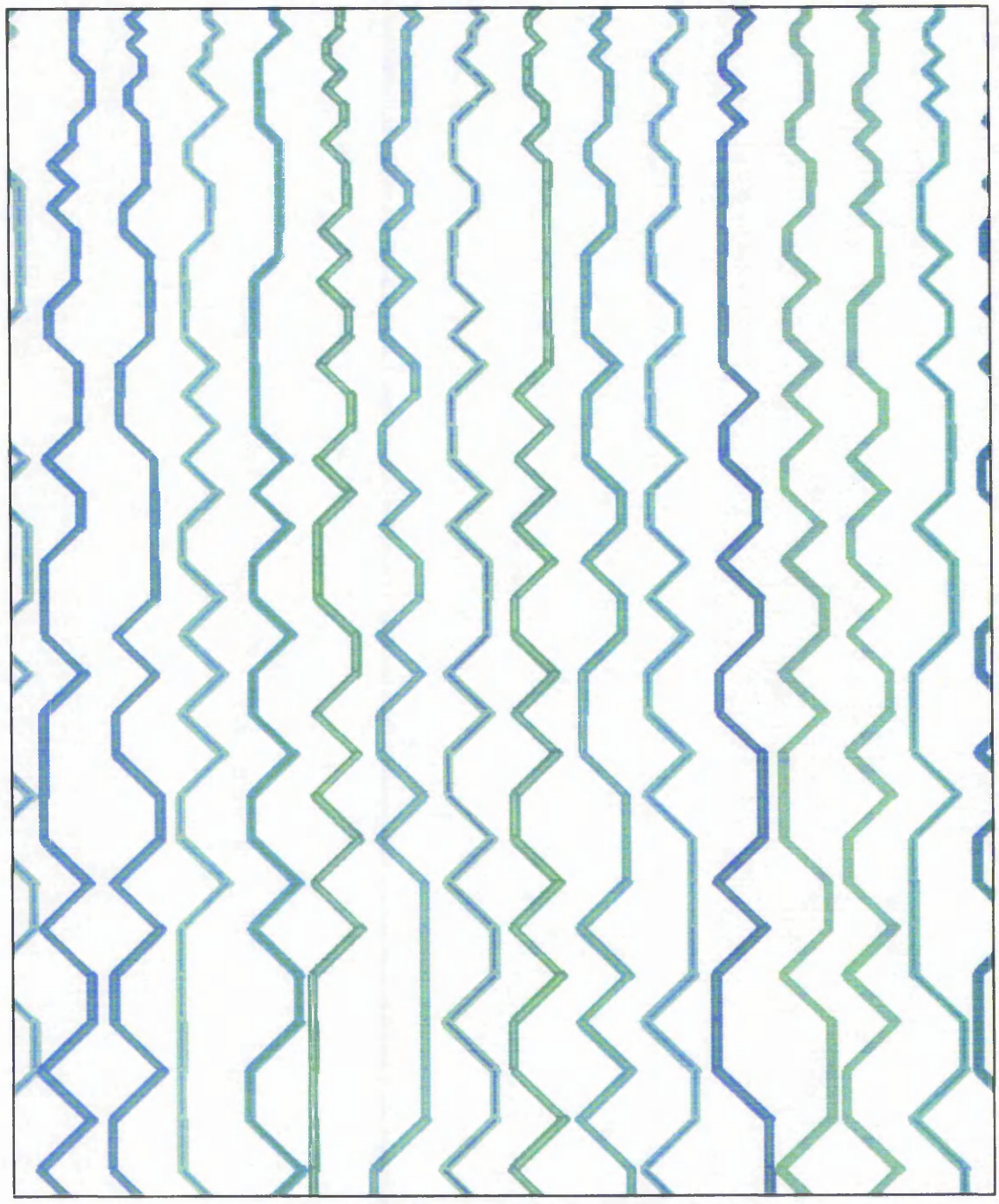


Figure 5-AA: Squiggles (Less Restrained)

5.5.2.11.1 Design Criteria

Following on from Pattern Type 10, this pattern type was also devised to push the boundaries of the cohesion conventions. This progressive design is very similar in concept to Squiggles (Non-Touching) and Squiggles (overlapping). The idea of progression is taken a stage further, so that the lines start off at the top of the drawing

area with small unit lengths, and touching does not occur. As the design continues the unit lengths become greater, so overlapping begins to occur. Each line contains an outline in a different colour. The line widths can vary, though this is barely visible. Figure 5-BB shows a design example from this pattern type which has been reduced in scale to highlight the effects of the progression.

5.5.2.11.2 Predetermined Features (Hardcoding)

The horizontal distance between the starting points of the lines is 12mm. The initial vertical height of the line unit is 2mm. For diagonal lines, the initial horizontal distance from the vertical column vertex is 2mm, to either the left or right. These distances increase by 0.2mm for each vertical unit as the line proceeds down the canvas.

5.5.2.11.3 User Determined Features

The user can choose the colour range.

5.5.2.11.4 Program Procedure

The same procedure as Squiggles (non-touching) applies, (see section 5.5.2.5), except that on each increment the x and y values of the end point of the line are increased by 0.2mm. A second line is drawn in the same place as the first with a smaller pen width, to give the effect of an outline. The colour for this is randomly chosen to be between 3 and 5 colours away from the original. The pen width is randomly varied from between 2 and 3mm in 0.1mm increments.

5.5.2.11.5 Observations

This pattern requires at least half a metre of length before its effects become clear. The extra level of progression provides interest and allows the pattern to move away from the uniformity that Squiggles (non-touching) shows over a considerable length. The cohesion conventions are stretched by this pattern type as it could be difficult to place pattern pieces in such a way as to prevent obvious mismatches. However, for certain applications, for example dress lengths, this feature may make an interesting variation.

The effect of decreasing the restrictions on this pattern type, over the original Squiggles pattern type has been to increase the irregularity, albeit in a very controlled manner. The use of variable coloured outlines also provides a little more irregularity,

but overall there is not much distance on the scale of gendered pattern features between this and its previous incarnation.

5.5.2.11.6 Recommendations

The user could be provided with options to choose line width and distance between columns. The routine could also be reprogrammed to take into account the length of the drawing area specified, and regulate the incremental line length changes over that area, between a user-specified minimum and maximum. This would make pattern cutting for a particular garment much easier.

Similarly, considerable development of this prototype could be made by incorporating it with software whose purpose is to aid the positioning of pattern pieces on the fabric. If this were achieved, the individual pattern pieces could be drawn and filled with a non-repeating pattern directly onto the fabric. The scale of the incremental line changes could then be adapted to the pattern pieces. This would have a supplementary cost benefit in that ink would only be required to colour the pattern pieces, rather than the entire surface of the fabric including what would become the discarded wastage between pieces.

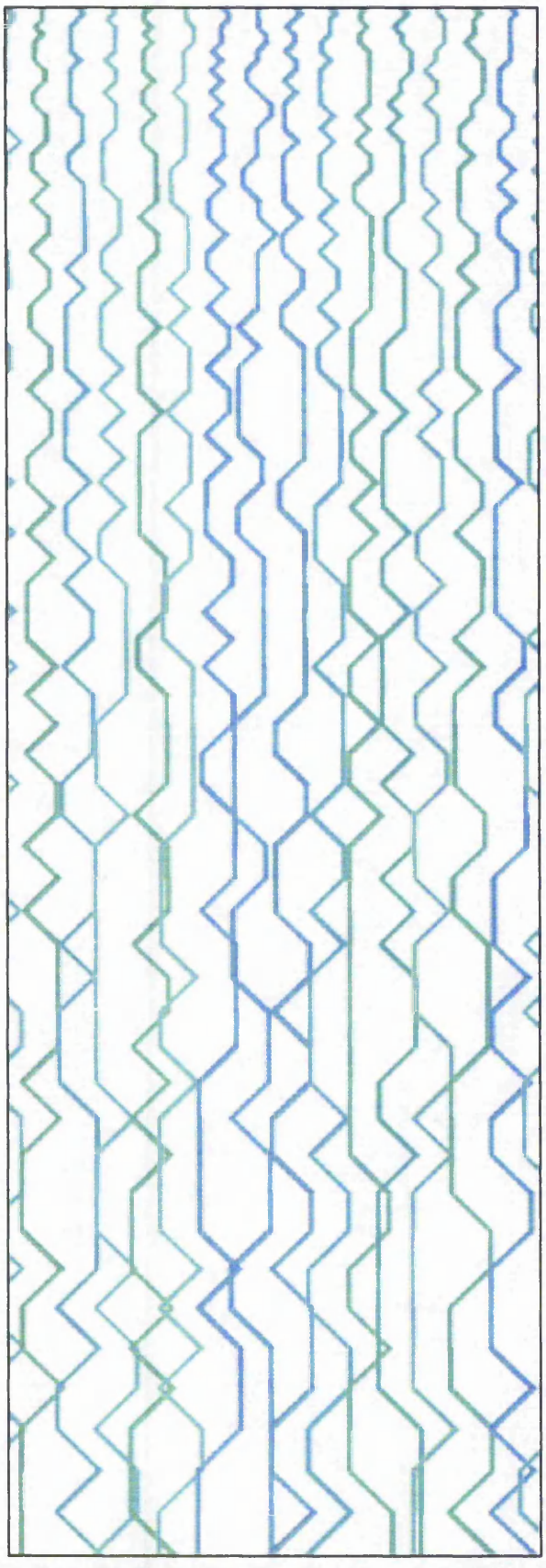


Figure 5-BB: Squiggles (Less Restrained) with reduced scale to show effect over 0.6 metres

5.5.2.12 Pattern Type 12: Co-ordinate Triangles

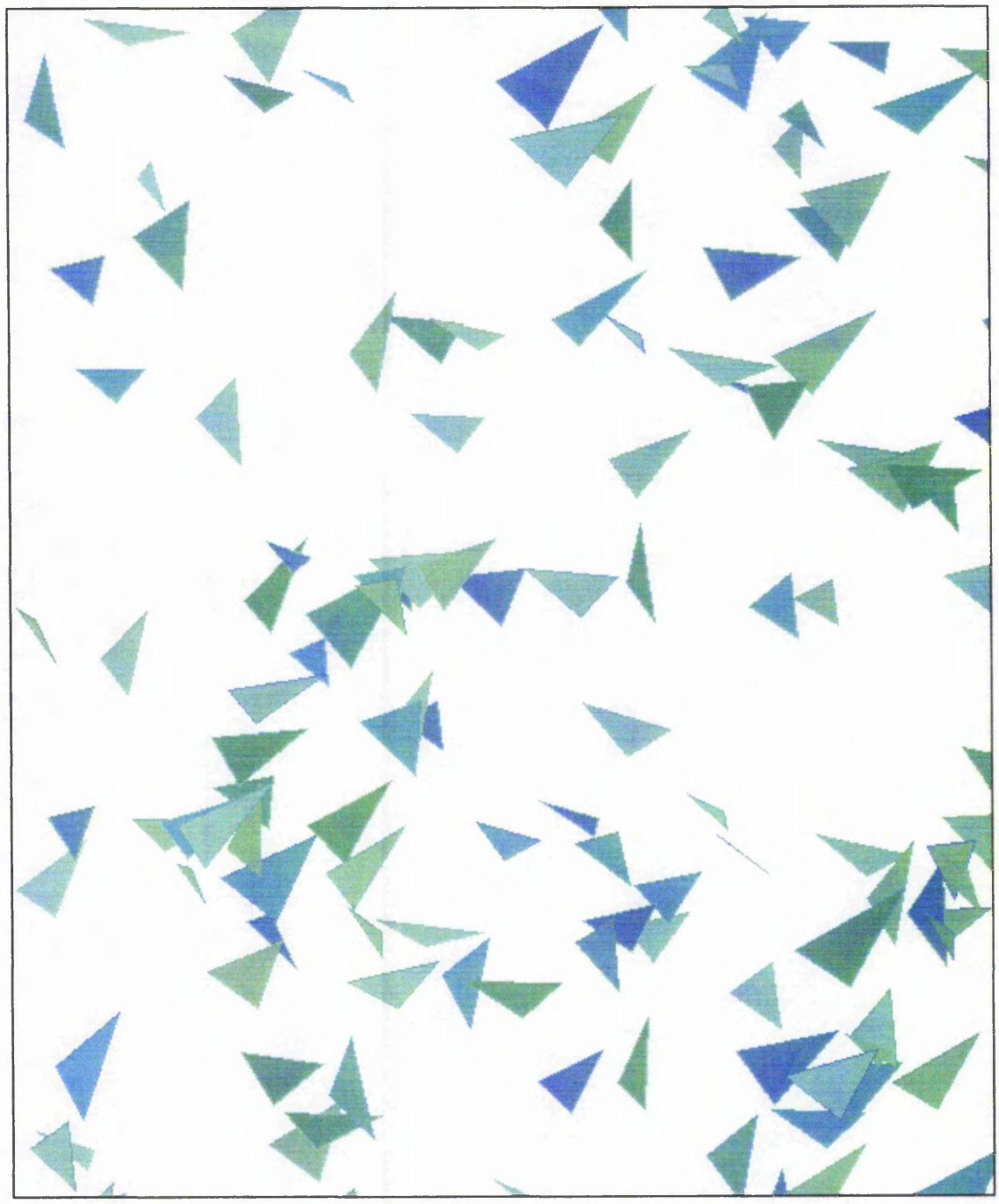


Figure 5-CC: Triangle Coordinates (Sparse)

5.5.2.12.1 Design Criteria

This pattern type represents the only co-ordinate based pattern available in the prototype. Triangles of varying sizes and shapes are placed at random co-ordinates over the drawing area. The angular motif and irregular placement are intended to provide balance between the gendered pattern features.

5.5.2.12.2 Predetermined Features (Hardcoding)

Background colour is the tenth in the chosen colour range.

5.5.2.12.3 User Determined Features

The user can choose the colour range. The quantity of triangles present on the drawing area varies according to whether the sparse, medium or heavy distribution option is picked. The actual value is determined by dividing the numeric value of the drawing area (height x width) by 320, 200 or 60 respectively.

5.5.2.12.4 Program Procedure

1. SET background Colour = Tenth colour in selected range.
2. SET number of motifs = surface area divided by chosen distribution value
3. Draw the motif:
   - SET colour = RANDOM selection from the first nine values in the colour range.
   - SET x-coordinate of first vertex = RANDOM selection between 0 and width of canvas.
   - SET y-coordinate of first vertex = RANDOM selection between 0 and height of canvas.
   - SET x-coordinate of second vertex = RANDOM selection of between 5 and 10 mm to the left or right of the first vertex
   - SET y-coordinate of second vertex = RANDOM selection of between 5 and 10 mm above or below the first vertex
   - SET x-coordinate of third vertex = RANDOM selection of between 2 and 15mm either side of the centre point between the first two x-co-ordinates.
   - SET y-coordinate of third vertex = RANDOM selection of between 2 and 15mm above or below the centre point of the first two x-co-ordinates.
   - DRAW and COLOUR the triangle
4. REPEAT step 3 until the appropriate number of motifs fill the surface.

5.5.2.12.5 Observations

This pattern type is completely free from the structure dictated by the progressive or grid-based pattern types. Quite different effects are achieved by changing the density of the motifs (see Figure 5-DD and Figure 5-EE). The motifs tend to form clumps, giving interesting shapes and negative spaces. Using the triangle, to offset the organic flow of the random co-ordinates with a geometric shape, actually enhances the organic feel as the motifs appear like fish shoaling or birds flocking. The method of calculating the vertices of the triangles allows many different shapes, which again adds to the erratic feel. Sometimes, triangles appear as lines, due to their very narrow height.

Once again, the negative spaces become important, and selecting a colour range with a light or dark ground produces very different visual effects. Though the commercial anxiety of this type of design would be that large areas could be missed, while other areas are over-populated, in reality this seems rarely to be the case. Probability theory dictates that over a large area with a significant number of motifs, the canvas will be fairly evenly populated, though in reality the possibility of gaps cannot be ruled out. The small scale of the motifs will also lend itself to providing a more even distribution over a larger area. While the cohesion conventions cannot be said to be strictly adhered to, the risk of violating them are quite small.

It has been observed that the left-hand edge of the design appears sparsely populated. The routine allows the second co-ordinate to be to the left of the first, thus giving some motifs the appearance of running off the left-hand edge. However, there will inevitably be fewer motifs along this edge as no motifs have first co-ordinate outside of the drawing area and second co-ordinate within the drawing area.

5.5.2.12.6 Recommendations

Starting the design with negative x-co-ordinates could rectify the above problem, so that some motifs were drawn partially off the drawing area. The motif density would need adjusting to compensate for this. Allowing the user to draw motifs, or select a range of motifs would add interest, as would providing a more flexible distribution option.

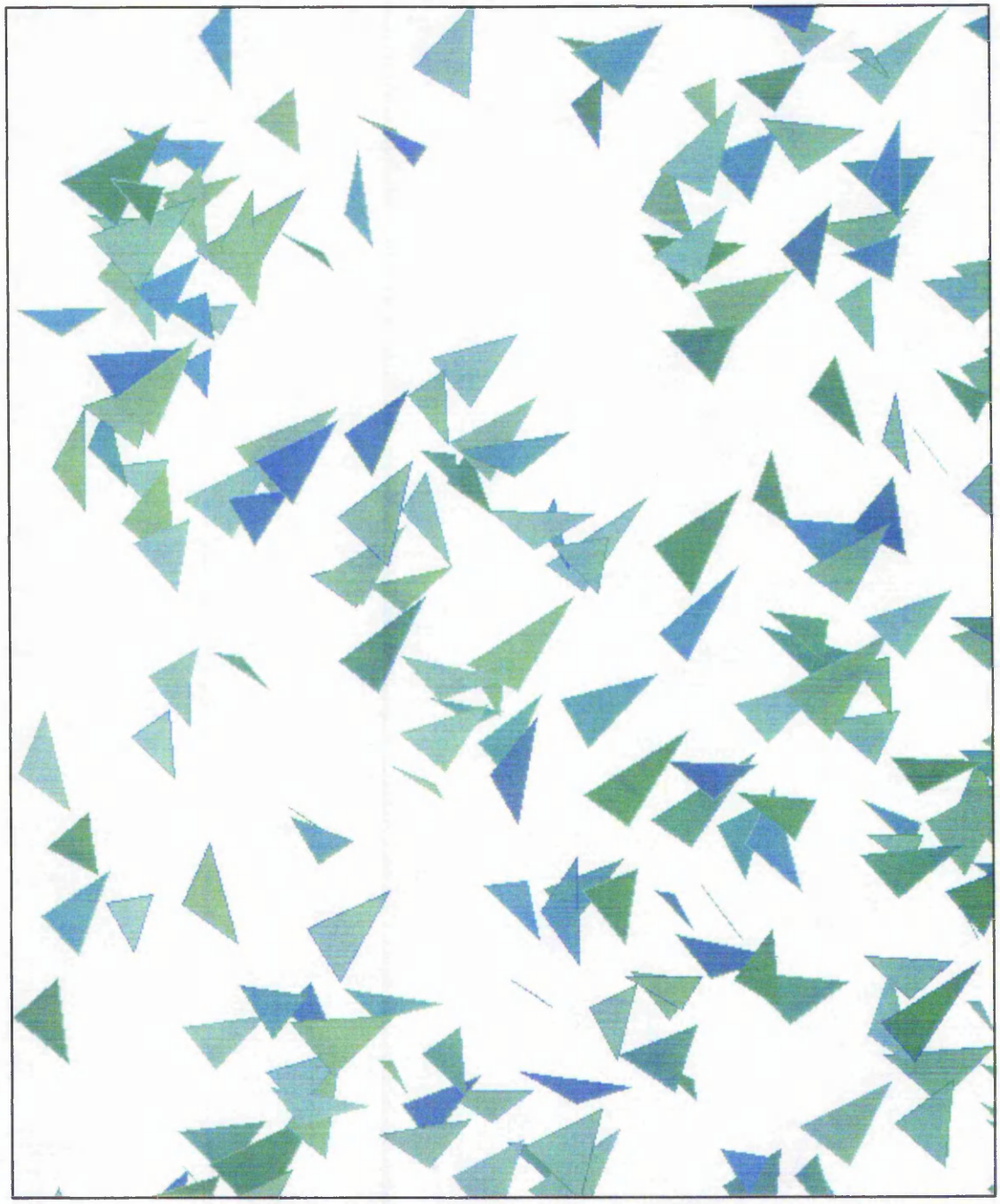
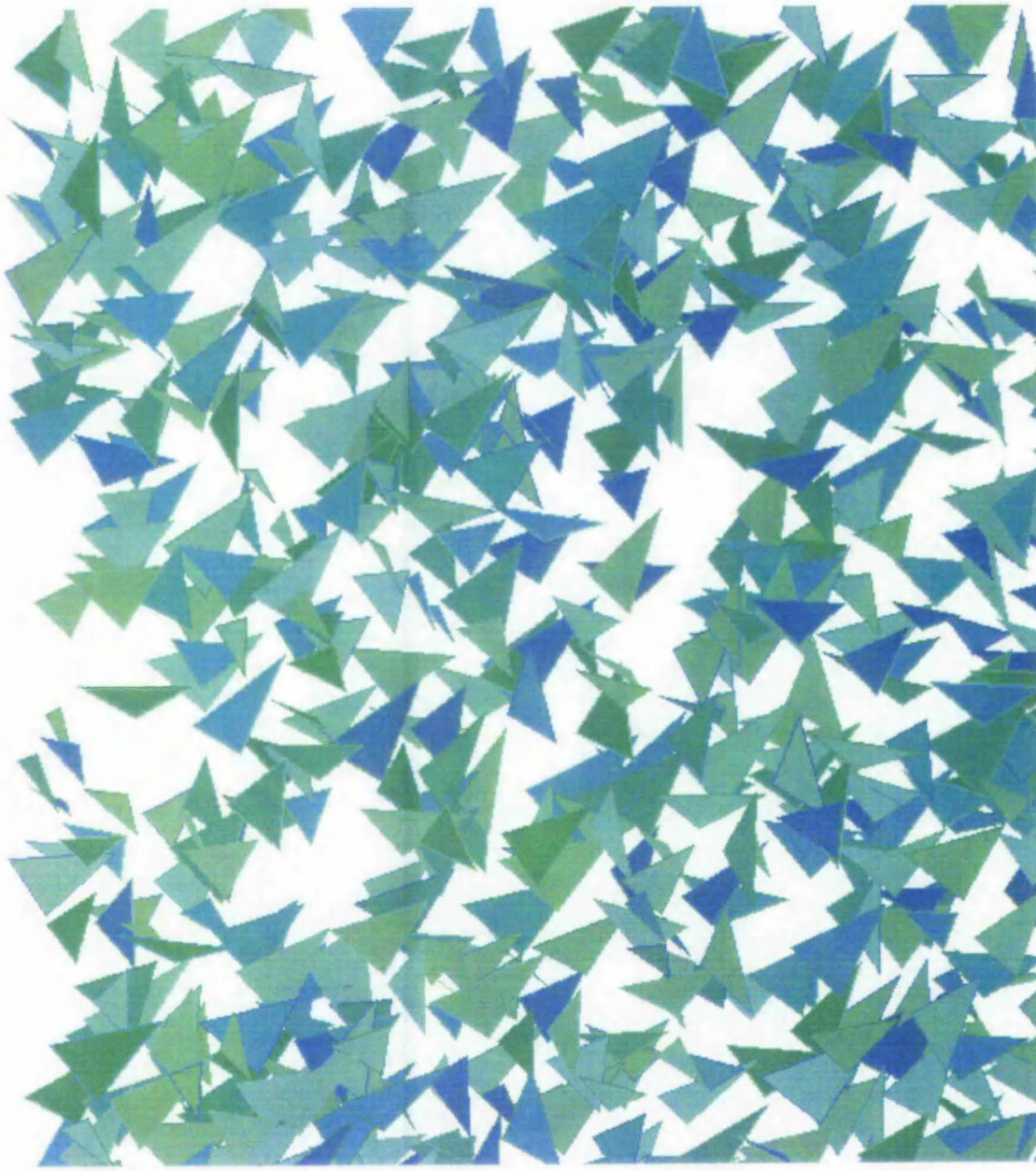


Figure 5-DD: Triangle Co-ordinates (Medium)



Chapter 6

Conclusion: Towards a New Design Strategy

This thesis has documented a research journey through which a new design strategy, a software prototype and design examples have been created. The journey begins with four inspirations: the importance of gender in pattern design on textiles for clothing; an enthusiasm for computer aided design; the ambition of promoting the status of textiles as a design discipline; and the desire to produce contemporaneously relevant textile designs for clothing. These four inspirations developed into the hypothesis stated in the introduction: it is possible to construct a design strategy, using a combination of cultural and visual analysis, which, acknowledging the current ambivalence towards traditional gender roles, supports the creation of relevant and credible contemporary printed patterns for clothing. As the thesis has shown, and this conclusion will highlight, this hypothesis has been realised. In this final chapter, each stage of the research will be re-examined, the conclusions highlighted and recommendations for further research will be made. Following that, the major outcomes of the research and their benefits to theoreticians, practitioners and commercial ventures will be discussed. Finally, I will propose how this work may be directly furthered by future research.

The outcome of Chapter One was the definition of a set of gendered oppositional visual features associated with pattern styles, named as the gendered pattern feature set. The set consists of the polarities of geometric/organic and angular/curved, together with the continuum of regularity. In fact, all the pairings are more appropriately considered as continua; in each case the extreme points of the continua represented the most extremely gendered representation. This definition was achieved through the examination of theoretical work which has examined the traditional cultural dualities which can be mapped on to the gender polarity of masculine/feminine. Fashion and clothing studies which have considered gender were then utilised, together with other studies concerned with identification of gendered features in visual images, in order to extend the oppositional theory in to the realms of pattern design.

One further continuum which was added to the set was scale, though this does not easily fit into the theoretical model used for the other pattern features. The contradictions lie in the descriptive methods used to describe a large scale pattern. Often words such as 'bold' are used to describe these patterns, however, bold is the

opposite of timid, and a gendered mapping of this polarity would undoubtedly align bold with masculine and timid with feminine. But it is clear that throughout the twentieth century, larger scale patterns have been mainly worn by women. The visual data in Chapter Two confirmed this, and highlighted the usefulness of including it within the set.

Chapter One also highlighted the potential pitfalls of attempting to apply fixed meanings through any analysis of contemporary culture. Our postmodern view of the world has enabled us to embrace the anomalies and conjunctures which analyses of this type tend to bring to light. The anomalies associated with the gendered pattern feature of scale have been addressed above, but another, associated, anomaly was highlighted by the scattered/regular polarity. While ambivalent ways of viewing these features exist, using the theoretical associations to explain their suitability for the gendered pattern set proved justifiable when the set was utilised in the analysis of pattern in the subsequent chapters. In other words, while it is possible to view the gender associations of the scale and regularity continua in different ways to the ones used here (with the continua extremes of large scale and irregular the most femininely associated), the visual data shows this association to be valid and useful in the analysis of pattern on clothes.

An aspect of Chapter One which could be developed through further research is the use of deconstruction theory as a design tool, though its tendency to create uneasy and uncomfortable products through its necessary endeavour to subvert and destabilise polarities are in some ways at odds with the specific aims of this project to democratise polarities, and the overall aims of producing wearable patterns for clothing.

The research in Chapter Two shows that the gendered pattern feature set defined in Chapter One provides a useful method for the analysis of visual data from a historical period and that the results of this visual analysis may be correlated with significant social issues of the period. The slightly anomalous addition of scale to the list highlights some particularly interesting elements of the analysis. As was stated above, in situations other than pattern on clothing, large-scale, bold images may be masculinely associated, but experience suggested this was not the case for clothing. The use of very large-scale pattern for women's clothes in this period confirms this. It is also shown in this chapter that the large-scale patterns provide a way of disguising the repeat structure and hence allow a more organic, flowing and less structured

pattern, all of which add to the feminine associations. It may be considered, then, that while large-scale designs cannot directly be associated with femininity, the other elements conferred by the use of large-scale features in pattern on clothing gives an indirect feminine association.

The gendered pattern feature set provides a defined list of features which may be gendered masculine or feminine, which can in turn be translated into a series of continua. As the analysis shows, patterns for both sexes may demonstrate a mixture of features with masculine and feminine connotations. These continua provide sliding scales which can be used to loosely 'measure' the masculinity or femininity connoted by a pattern. In the data from this particular period of 1967 to 1973, the analysis shows that there was a heightened use of features with feminine connotations in pattern for men and women. It also shows that in most cases, the femininity signified in the pattern for men was in some way offset by masculine features, while women's pattern often displayed a complete absence of the features identified as masculine. The particularly feminised pattern of the period indicates that if a sliding gender scale for pattern is considered, its neutral point in this time period would not fall in the midpoint of the scale, but rather towards the feminine end. Using this analogy for other time periods would show that both the neutral and end-points of the continua vary from time period to time period.

The correlation with the social history of the period shows that the feminisation of pattern corresponds to a time of freedom and optimism. As the period was ending, pattern was showing signs of becoming less feminine, which correlates to a less optimistic period in which second wave feminism developed. It is conceivable that sexual liberation brought on the promotion of femininity and its subsequent acquisition by men, while women's liberation marked a deliberate turn away from the feminine by women who identified that sexual liberation had brought with it a proliferation of media images objectifying women. Further research would allow this proposition to be examined in more detail. Similar studies of other historical periods could also prove enlightening, particularly, with reference to the work of this chapter, the 1980s, in which it appears at first glance that there is a degree of reversal from the styles and ethos of the 1960s.

Chapter Three gives the research specific indicators concerning the ambivalence of gender definitions and roles in contemporary society through both the media and fashion analysis. These specific indicators assist in providing the 'relevance and

credibility' for the design strategy required by the initial hypothesis. Chapter Two demonstrated that use of the pattern feature set was beneficial in the analysis of pattern on clothing, and contributed towards the concept of 'measuring' the masculinity or femininity of a pattern. In Chapter Three this analytical technique was used to investigate the contemporary period of 1997 to 2002. The contemporary pattern designs were assessed using this technique, and many of the overall findings are similar to those highlighted in Chapter Two. In particular, a move towards pattern for both sexes suggests the neutral point of the gender scale moves towards the feminine, as does the use of organic imagery and larger scale pattern. As with the case study analysis, these feminine features are generally less developed, or balanced with masculine features when used on men's clothes. However, it was the combination of pattern imagery with the media and fashion commentary which best highlighted the contemporary ambivalence towards traditional gender definitions.

The discussion of the media driven 'crisis in masculinity' highlights some important views, in that it appears that while the definition of masculinity might be changing, it is still important for men to acquire and maintain it. Femininity, on the other hand, acquired negative connotations during the rise of second wave feminism in the early seventies which seemed to lead to the rejection of its associations by women, rather than its redefinition. The ambivalence towards the traditional definitions of masculinity and femininity suggests a breaking down of their oppositional roles and a move towards more fluid definitions of gender, in keeping with similar movements in other cultural forms. However, it does also suggest a resistance to these changes, and a requirement to maintain gender distinctions through clothing. In the creation of a design strategy which recognises and utilises gender symbols, but does not prioritise them, a celebration of non-hierarchical gender difference may be achieved.

In the contemplation of fluid and ambivalent gender identities and roles, an interesting aside comes to mind which relates to the writing of this thesis. I have used the words 'femininely', 'feminising', 'masculinely' and 'masculising' throughout the text. However, the *Microsoft* spelling checker does not recognise the words 'masculinely' or 'masculising'. While a thorough discussion of the use of these terms is not appropriate here, it is interesting that our contemporary culture has so little use for them that they are highlighted as spelling mistakes by word processing software. Development of the research in this chapter could be made by further investigation into the contemporary use of language to describe clothing and gender in fashion commentary, together with

further research into the attitudes of high street consumers with relation to clothes and gender.

Chapter Four continues in providing the 'relevance' and 'credibility' required in the hypothesis, by investigating the general interest in pattern and widespread fascination with randomness which permeates our culture. While, as discussed in Chapter Three, the contemporary popularity of concrete explanations proffered by scientific means may be attributable to the increasingly fluid and complex gender roles and identities we now have, the ambivalence and blurring of boundaries associated with postmodernism may also have given rise to less concrete ideas in science itself. Hence, there has been increased scientific interest in natural systems, which has led to the development of new research including chaos theory and biomimetics[1]. This scientific interest in nature and unpredictability has also filtered through to a wider audience, and is reflected in the imagery discussed in this chapter.

Two important products of Chapter Four were the identification of three distinct construction methods for design examples and the definition of a set of cohesion conventions which design examples are required to conform to in order to be viable aesthetically and commercially for printed fabric. The three construction methods were: grid-based, progressive, and co-ordinate based. Each method has specific characteristics which can be enhanced or disguised to conform to the cohesion conventions. For example, a grid-based pattern by nature will give uniform coverage of the canvas or fabric, but this may tend towards a boring or visually dull design with an obvious grid structure. In this case the emphasis on the development of the pattern is to create visual interest and disguise the grid effect. On the other hand, a co-ordinate based design, with its scattered motifs will almost certainly contain a degree of visual interest through the random placement of the motifs, but may not give uniform coverage of the canvas or fabric. For this construction method, emphasis on giving some level of uniformity or continuity is required. The visual examples illustrated in this chapter, both scientific and artistic, all show how random elements or imperfections augment the visual interest of the imagery, and in many cases provide an alliance with the natural, rather than the constructed world.

In Chapter One regularity was identified as one of the set of gendered pattern features used for analysis throughout the research, and the most ordered end of the regularity

[1] Biomimetics is the term used for research in which the workings of biological systems are studied in order to replicate their actions in constructed systems, for example heat gain and loss in performance clothing.

continuum was identified as masculine. It is necessary to remember that the gendered pattern features can only sensibly be utilised in relation to one another, rather than to wider-scale issues. If this is not comprehended, an apparent contradiction may be found, in that pattern in general has been identified as femininely associated, yet pattern on clothing almost always follows a repeating structure. While the contradiction may not be relevant when considering the gendered pattern features, it is most certainly of interest in the wider context of the research, particularly as the design examples can be seen as subverting the contradiction by producing patterns which do not repeat. It may be possible that by disregarding the masculine side of the contradiction, the feminine association and any negativity it holds is also lost or subverted

The outcomes of all of the previous chapters have led to the production of the software prototype and the design examples created through it. This is documented in Chapter Five. This software prototype assists in the production of thirteen different design examples, each of which may be varied by parameters entered by the user, and each of which are extremely unlikely to produce exactly the same image twice. Each design example conforms to one of the three types identified in Chapter Four and demonstrates a different effect which can be produced within that method. The set of gendered pattern features is once more utilised, though two, scale and regularity, have been restricted to small areas at the small-scale and irregular ends of the respective continuums. The use of smaller scale motifs enabled compliance with the cohesion conventions which were formulated in Chapter Four, and informed by the theoretical issues, design examples and commercial considerations. The use of irregular patterns is of course, the main emphasis of the project. However, these restrictions, rather than eliminating the continua of scale and regularity simply provide a smaller distance from end to end. All four continua are therefore identifiable within the design examples.

It should be stressed again, that this was not an attempt to create unisex patterns which would appeal to both genders equally, but similarly there is no attempt to be prescriptive about the suitability of any particular design for men or women's wear. In other words the patterns manipulate the gendered qualities in such a way as to present new visual messages in which historically-biased associations are no longer identifiable. In this way, new gender associations may be made, but in our contemporary society in which strict definitions are becoming fluid and gender boundaries are being redrawn with increasingly fuzzy edges, it would be hoped that

the hierarchical nature of difference would not be re-established.

Through this research, then, a design strategy has been developed which fulfils the hypothesis stated above. Visual features of pattern were identified as gendered through the examination of theoretical studies into gender and cultural polarities. These visual features formed the extreme ends of four continua: angular to curved; geometric to organic; scale; and regularity. The continua were then exploited to assess the relative connotations of masculinity and femininity in pattern designs of a particular historical period, which allowed for the assertion that the gender connotations in pattern could be 'measured' in a loose way along a masculine to feminine continua on which the neutral point, rather than being maintained as the centre point, varies over time. A critical evaluation of the social climate and use of pattern in the contemporary period then assisted in highlighting the relevance of the prospective design examples, as did a wider look at the scientific and artistic imagery produced by engaging with the concept of randomness and non-repeating structures. The commercial requirements of non-repeating fabric were incorporated with the theoretical and aesthetic considerations to produce cohesion conventions for three separate construction methods. Adherence to these conventions ensures that the design examples conform to the project's aims. Finally, a software prototype was produced which facilitates the gendered pattern features and cohesion conventions to produce design examples of all three types.

This design strategy, involving the interweaving of theoretical, social, historical, and commercial threads with the technical construction of computer software and design examples, lends itself readily to becoming a model for a variety of other research in the area of textile design. In particular, it could be adopted for research into constructed textile design, where computer technology has been utilised for a much longer period. Similarly, other cultural aspects such as race or sexuality could be explored through the manipulation of this model, perhaps culminating in manually created design examples where appropriate. The design strategy also lends itself to a more general appropriation in which research focuses on a particular theoretical issue and develops visual parameters for assessment through that issue, tests those parameters on visual historical data, adjusts and improves the parameters for use in the contemporary environment and uses the resultant knowledge from the combined theoretical and visual approach in the production of innovative design examples.

While artists have been experimenting with computers and the use of random

parameters in their work for over thirty years, this has never before been combined with the use of conventions consistent with the requirements of commercially printed fabric production, hence the anomalies and degradation which these conventions seek to control are often heralded as some of the most interesting features of artistic work. The conventions dictate that some uniformity will exist over the surface of the design, and this may well be a consumer requirement as well as a commercial one. As non-repeating patterns have yet to be presented to the consumer, familiarity, that is to say the use of an overall effect, albeit not a repeating one, may well be welcomed.

This software prototype represents a unique device for the construction of innovative design examples which have the potential for transfer to fabric. Its construction indicates not only the reality of the examples produced within the research, but the potential for future applications in which designers could work with the software to create individual patterns of many different types without the necessity of understanding a programming language. Future collaboration with manufacturers of ink-jet printers for fabric would enable software to be developed which would allow the patterns to travel directly from the designer's computer screen onto fabric. Collaboration with software designers would enable further progression of the software into a potentially viable commercial application for textile designers.

The design examples themselves demonstrate many of the different qualities which can be achieved through the combination of random and controlling parameters. The geometric qualities which many of the design examples exhibit is largely due to the constraints of the prototype. Adapting the software to allow a range of less geometrically precise patterns to also be produced could be addressed in future research. Examples of less precise patterns can easily be demonstrated by further manipulation of the existing digital design examples with a raster-based[2] CAD package such as Photoshop.

The visual qualities of the design examples have, to a large extent been driven by the criteria of the design strategy, rather than by personal aesthetic decisions, though these have obviously played a part in all the examples as decisions were made which, however unconscious, are nonetheless prone to the personal subjectivity which is part of the usual design process. The designer or user of the system does have the ability to adapt the patterns in some ways and this is another area in which future

[2] Raster-based software identifies each pixel on the screen by a colour value, unlike vector based software which stores information through the use of mathematical equations and hence has a tendency towards geometric precision.

development would allow more flexibility in choosing aesthetic and market based criteria for pattern creation. The software could be adapted in one of two ways: it could remain an individual design tool in which more personal aesthetic values are embedded into the program, or it could be developed into a tool with much wider appeal in which any individual designer could create patterns which incorporate their own personal aesthetic style.

At a recent symposium on digital technologies for applied artists, jewellery designer Christoph Zellweger described using computer-aided design tools as 'always painting on a wet canvas' (Zellweger in Pixel Raiders 2002) in that most experiments and intermediate stages of development are lost through the over-writing of computer files with the subsequent stage. This is an analogy which I readily recognise from the development of the software prototype. In most cases, when my coding produced an unexpected example on the computer screen, I returned to the program and adapted it to give the results I required. The experimental image on the screen was lost without record. However, sometimes, mistakes in coding can lead to interesting developments which would not have been unintentionally conceived. At the same symposium, textile designer Jane Harris described her own work with CAD and three-dimensional fabric forms. She gave a statement which positively echoes my feelings about working with computer technology:

> Mistakes, accidents and limitations in software use can offer other unexpected working methods & media, if viewed openly. With this thinking, new & individual digital languages may evolve. (Harris in Pixel Raiders 2002)

In summary then, this research has developed a new design strategy for textiles which incorporates the investigation of cultural and visual features of pattern on clothing, examines and questions the very nature of the features of a printed textile and instigates an innovative design process which allows those features to be manipulated and reconfigured without undermining the necessary prerequisites of commercially printed fabric. This pioneering process can be seen as providing one particular signposted route by which pattern for clothing can continue as viable and desirable in the twenty-first century mainstream commercial marketplace. It also provides signposts to numerous less well-defined trails, which I anticipate being trodden by a wealth of future research.

106
total.

Appendix A: Survey Results

A sample of the questionnaire is shown in Figure 1. The survey was conducted to investigate gender associations in words and images associated with textile patterns. Images and words were both used to accommodate any bias being given to particular words through the look of the word rather than its meaning.

105 people responded to the questionnaire. The respondents came from a wide range of backgrounds, including academics, designers, office and manual workers. Each was asked to give their first name, occupation, age and sex, then to tick 'feminine', 'masculine' or 'neither' for each image or word. They were instructed to use the 'neither' box if they found categorisation difficult. A few of respondents ticked both the masculine and feminine boxes. This was translated into 'neither' for the purposes of analysis, and acknowledged as a design flaw in the questionnaire. The word 'Neither' should possibly have read 'no preference', or something similar. No attempt was made to make the polarities obvious, hence the respondents were not obliged to tick masculine for one pole, because they had ticked feminine for its opposite.

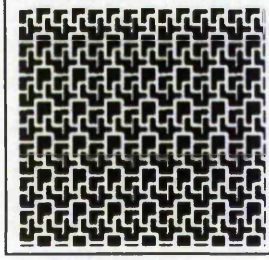
41 men and 65 women responded, falling into the ratio 2:3 men to women. The results were very similar for both sexes, see tables and graphs below. A similar split of 2:3 occurred in those respondents below and above the age of thirty, see Figure 3. Those below thirty showed much higher tendencies to stereotype, though a high proportion of these people were textile designers, so it is unclear whether it was age, or occupation which caused this result. A much larger sample would be needed to elaborate on these findings.

This Questionnaire is Strictly Confidential

First Name:..... Occupation:.....

Age:..... Sex: Male/Female

Please ✓ the box to indicate which pictures and words you consider masculine or feminine. If you find it difficult to categorise them, please tick 'Neither'. Feel free to skip any question you would rather not answer.

	Masculine	Feminine	Neither
			
			
			
			
			
			

	Masculine	Feminine	Neither
Angular			
Chaotic			
Checked			
Curved			
Floral			
Geometric			
Linear			
Ordered			
Organic			
Regular			
Round			
Scattered			
Spotted			
Square			
Striped			

Figure 1: Sample Questionnaire (scale slightly reduced)

Image/Word	Feminine	Masculine	Neutral
Square Image	1	91	13
Squiggle Image	68	6	31
Diagonal Image	2	49	54
Circle Image	71	6	28
Floral Image	101	0	4
Geometric Image	6	53	46
Angular Word	1	89	15
Chaotic Word	23	27	55
Checked Word	10	60	35
Curved Word	94	0	11
Floral Word	99	0	6
Geometric Word	3	70	32
Linear Word	8	48	49
Ordered Word	30	31	44
Organic Word	59	4	42
Regular Word	12	40	53
Round Word	66	6	33
Scattered Word	40	14	51
Spotted Word	45	7	53
Square Word	3	89	13
Striped Word	11	43	51

Figure 2: Tabular summary of all survey results

Age Group	Number of people Surveyed
Under 20	3
20-29	40
30-39	41
40-49	12
50-59	8
60+	1

Figure 3: Tabular summary of head count by age group

Image/Word	Feminine	Masculine	Neutral
Square Image	1	55	8
Squiggle Image	40	4	20
Diagonal Image	1	26	37
Circle Image	42	1	21
Floral Image	62	0	2
Geometric Image	2	33	29
Angular Word	0	54	10
Chaotic Word	13	15	36
Checked Word	5	39	20
Curved Word	54	0	10
Floral Word	60	0	4
Geometric Word	3	41	20
Linear Word	8	20	36
Ordered Word	21	14	29
Organic Word	37	3	24
Regular Word	9	22	33
Round Word	42	2	20
Scattered Word	24	9	31
Spotted Word	28	5	31
Square Word	2	53	9
Striped Word	4	25	35

Figure 4: Female Results from Survey

Image/Word	Feminine	Masculine	Neutral
Square Image	0	36	5
Squiggle Image	28	2	11
Diagonal Image	1	23	17
Circle Image	29	5	7
Floral Image	39	0	2
Geometric Image	4	20	17
Angular Word	1	35	5
Chaotic Word	10	12	19
Checked Word	5	21	15
Curved Word	40	0	1
Floral Word	39	0	2
Geometric Word	0	29	12
Linear Word	0	28	13
Ordered Word	9	17	15
Organic Word	22	1	18
Regular Word	3	18	20
Round Word	24	4	13
Scattered Word	16	5	20
Spotted Word	17	2	22
Square Word	1	36	4
Striped Word	7	18	16

Figure 5: Male Results from the Survey

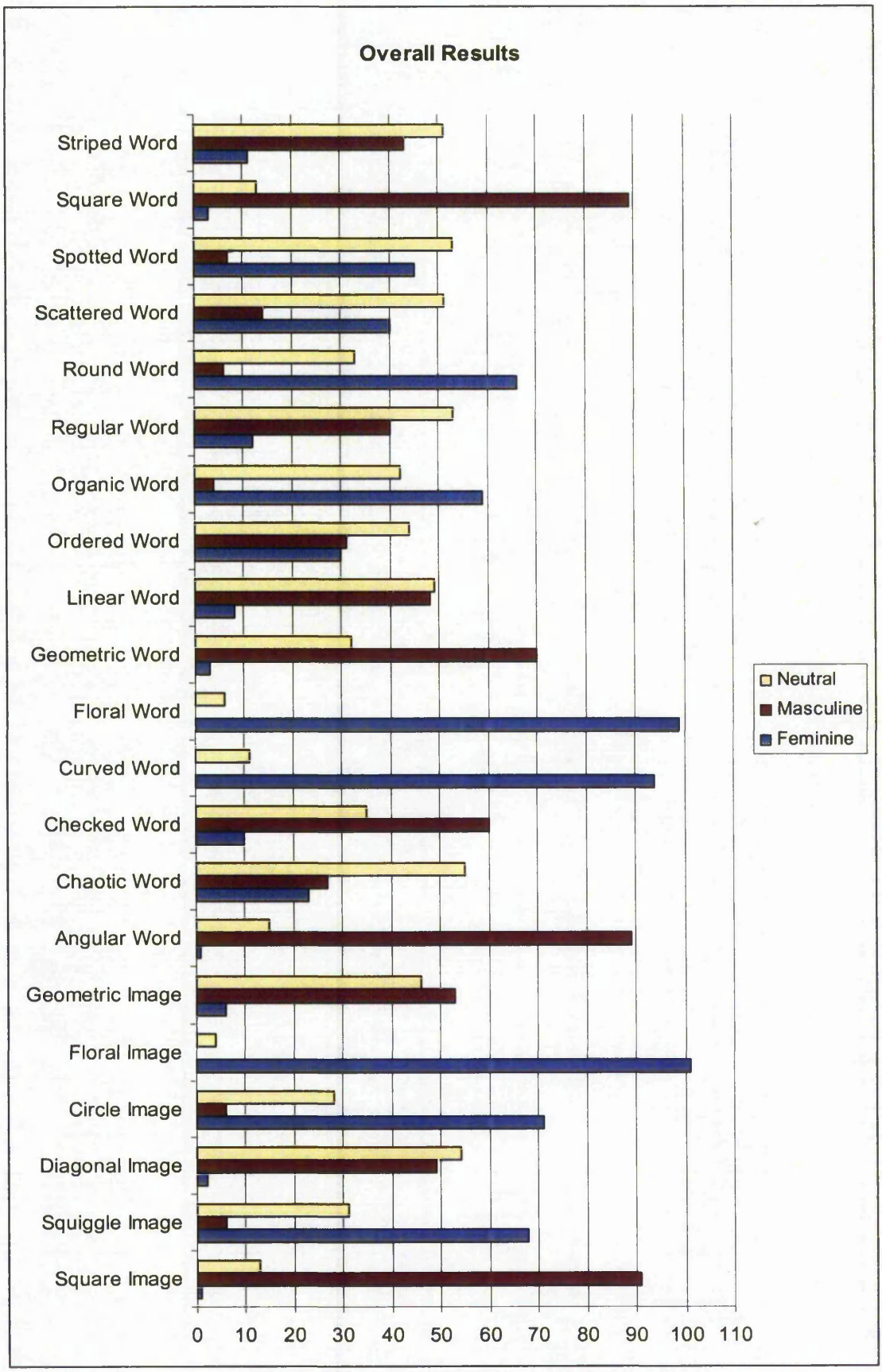


Figure 6: Graphical Summary of Results

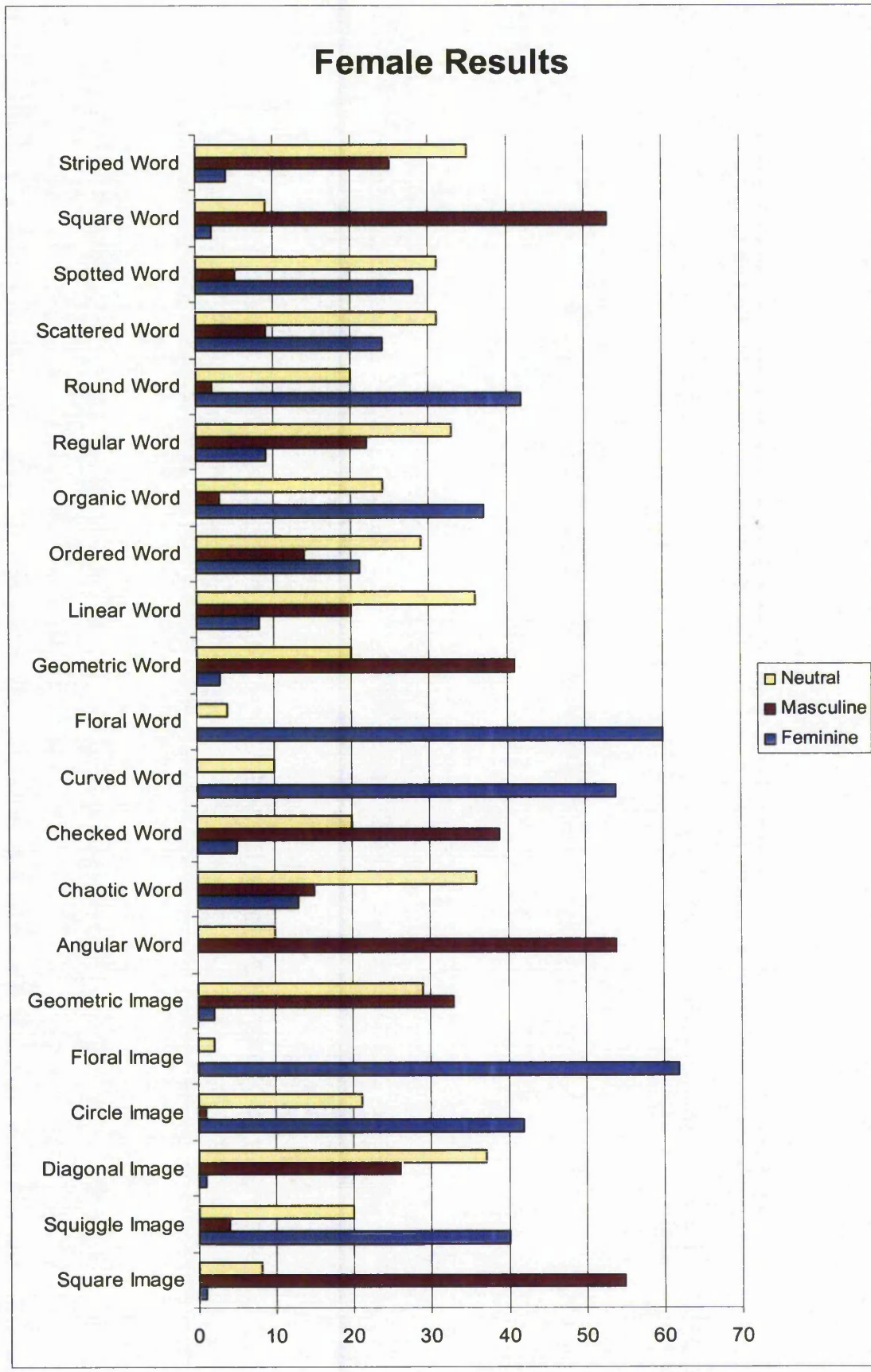


Figure 7: Graphical Results from Female Respondents

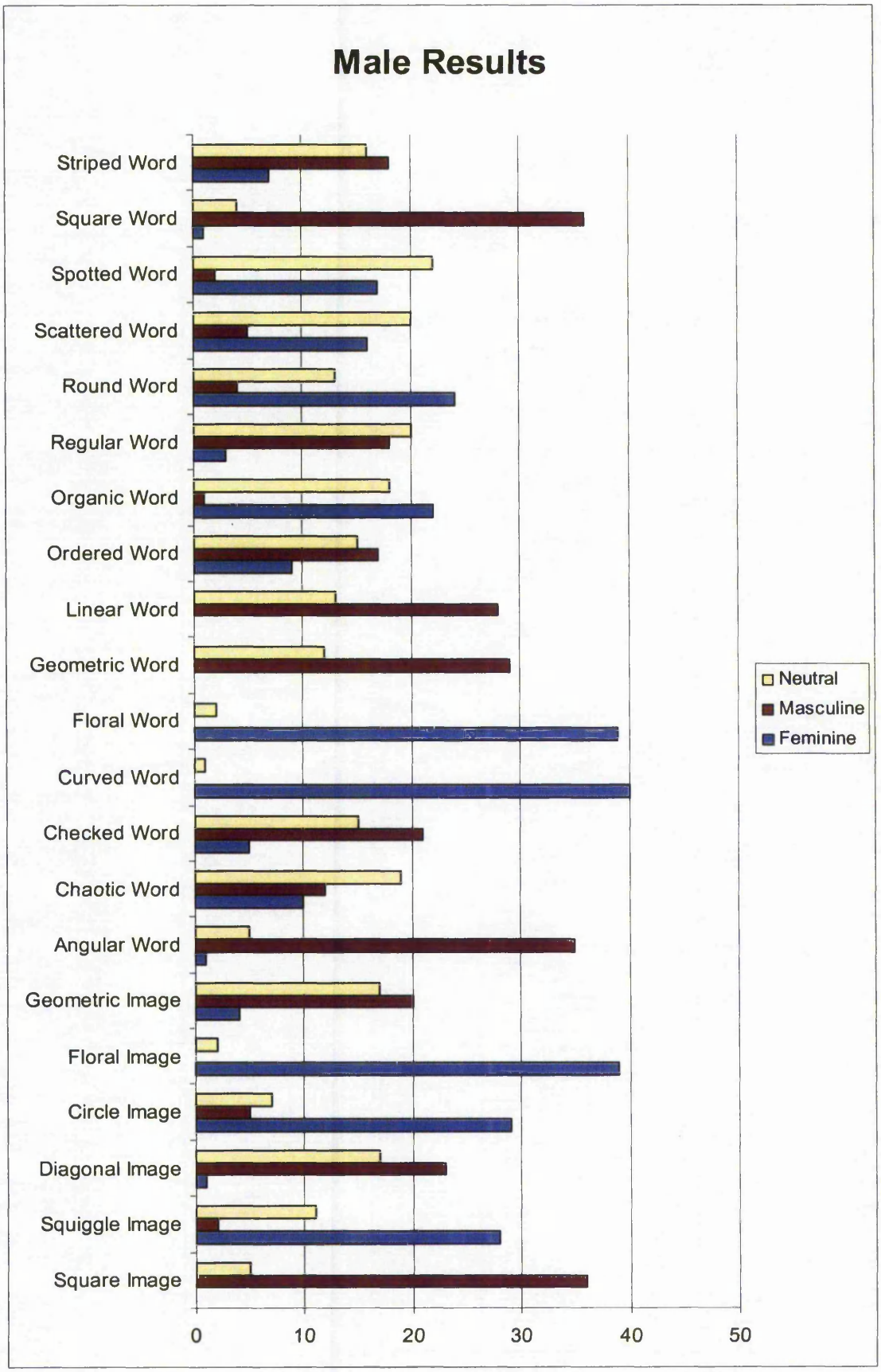


Figure 8: Male Results from Survey

Appendix B: Pattern Classification

The word 'mainly' is used to mean more than half, as far as can easily be judged by eye.

Angular	Contains mainly straight lines and shapes, some of which intersect to give angles
Curved	Contains mainly curved lines and shapes
Geometric	Forms a very regular pattern, usually made up of lines or geometric shapes such as squares, diamonds ore triangles, but could contain other motifs if the overall impression is very regular and structured
Floral	Mainly consists of recognisable flowers and/or leaves
Striped	Either solid stripes are visible across the fabric or the motifs are placed to form clearly visible stripes
Spotted	Mainly consists of solid or outline circles or ellipses
Regular	Design is composed in such a way as repeat is obvious and regular
Irregular	Design shows no easily recognisable repeating pattern, motifs appear randomly placed possibly with the same motif shown rotated at different angles.
Non-representational	Design has no obvious motifs that can be identified as objects, such as flowers, leaves, ribbons etc.
Representational	Design has some motifs that are easily identified as objects such as flowers, leaves, ribbons etc.
All Over	Motifs cover more than half of the design, with less than half background showing.
Scattered	Motifs cover half or less of the design, with half or more background showing
Multicoloured	Contains at least three colours from different parts of the colour wheel
Tonal	All or all but one colours in design from same part of the colour wheel same colour with tonal changes e.g. orange/red, red, red/purple, or pink, red, dark red and black
Paisley	Design contains mainly paisley motifs or the largest motifs are paisley
Small	Five or more of the largest motif will fit in the models hand width ways, ie across hand from thumb to forefinger OR largest motif is 2cm x 2cm or less
Medium	Between one and four of the largest motif will fit in the models hand width ways, ie across hand from thumb to forefinger OR largest motif is between 2cm x 2cm and 10cm x 10cm
Large	Less than one of the largest motif will fit in the models hand width ways, ie across hand from thumb to forefinger OR largest motif is bigger than 10cm x 10cm

Appendix C: Published Articles

Chapter Published in *Visual Representations and Interpretations*
Paton, R & Neilson I (Eds) 1999 London: Springer

Breaking the Monotony: Using Randomisation Techniques in Computer-Aided Textile Design

Hilary Carlisle, Peter Phillips, Gillian Bunce

Department of Fashion & Textiles,
The Nottingham Trent University, UK

Abstract

Most designs on fabric are of a repeating nature due to the mechanical processes involved in weaving, knitting and printing. This paper examines the possibilities of engaging with new technology to produce non-repeating designs for printed fabric.

Background

Mass-produced fabrics almost always contain a repeating element to their pattern design. The mechanisation processes of weaving, knitting and printing patterns have made this a necessity for the majority of textile production.

Whereas the warp and weft structure of a woven fabric, and the stitch structure of knitted fabric lend themselves perfectly to geometric-style repeating patterns, there are no such concrete boundaries for printed fabric. Economically, however, repeating patterns have been favoured, to reduce the number of screens or rollers required, and the amount of skill and time to produce the fabric.

In the last century, much emphasis was placed on the pattern repeat, and producing a pleasing pattern was highly regarded. A motif that appears attractive in isolation may become unattractive in repeating formation. If a block repeat is used, as shown in figure 1, unintentional horizontal or vertical stripes, or even checks, can appear. The half-drop repeat, as shown in figure 2, is commonly used to disguise the repeat and overcome the problems associated with the block repeat, but this sometimes produces undesirable diagonal stripes.

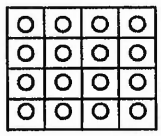


Figure 1

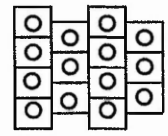


Figure 2

Obviously, stripes, checks, and rigidly structured designs are sometimes in demand. The advantage of a bold repeat is that it can be incorporated into the design of the garment. For example, a striped fabric could be used horizontally on the sleeves and vertically on the body of the garment, or diagonally to produce a chevron effect. Garments produced this way are distinctive and quite different in appearance to ones made from the same pattern pieces in a plain fabric, or one without a heavily repetitive design. The disadvantages of this technique are twofold: more skill is required by the pattern cutter to align the pattern pieces to the fabric and there is more wastage in the fabric itself.

Time and economy have become more and more valuable in the textile industry, as with most industry, as this century has progressed. This has led to a move away from obviously repeating patterns to ones in which the pattern is disguised or inconsequential. A pattern of this nature allows pattern pieces to be placed in any direction on the fabric, cutting down on wastage. If a motif is scattered across the repeating unit, in seemingly random directions, there is less chance that the repeat will be obvious [1]. Similarly, if a large repeat unit is used with large, but similar motifs covering most of the fabric's surface, the repeat can be hidden. This is a consequence of the pattern pieces within the garment not incorporating more than one repeat of the pattern while the similar motifs provide an overall uniformity which prevent the garment seams being obvious, however the fabric is cut.

The latter part of this century has also seen a backlash against the perfection made available through the use of technology and high-level mechanisation. Whereas in the early days of mass-produced printed fabric, the most sought after prints were those which appeared most perfectly printed, we now have manufacturers who deliberately incorporate faults to give fabric a 'hand-crafted', and hence desirable, look.

Project Motivation

This research is inspired by the idea of producing printed textiles, which while satisfying the current commercial criteria outlined above, are also inspirational and interesting to wear. Generally speaking, non-repeating designs on printed clothing are currently only seen at the couture end of the market, due to their handcrafted nature.

At present mass-produced printed fabric is produced by separately printing each colour, via rotary or flatbed screens, on to the fabric. The development of ink-jet printers, similar in principle to those used for colour printing on to paper, has been slow, due to the additional requirements of handling different cloth types and a necessity to use inks which can be made colourfast. Currently, machines capable of printing single metres of fabric are available, making them only suitable for sampling. However, commercial printers capable of several hundred metre lengths, should be available in the next ten years. This would enable the commercial production of non-repeating textile designs, fed directly from computer to printer, to become a reality.

Though there are commercial considerations for producing fabric designs in which the repeat is disguised, there are also aesthetic ones. As Gombrich states 'The monotonous may fail to register while the intricate may confuse' [2]. In general, patterns intrigue us, but a balance between boring and over-complicated needs to be found.

Design Methods

The designs illustrated below have no repeating pattern. They are developed using various manipulations of motifs dependant on a series of random numbers. The concept is to produce designs that look as though they may repeat, providing a degree of continuity that is normally associated with textile patterns. The elements of the design are carefully chosen to assist this. The designs are not computer generated. Once the random numbers have been produced, their effects are manually interpreted using Adobe PhotoShop software.

The first series of designs are based on a square grid. Figure 3 shows an example in which six different motifs are each assigned a number from one to six. A grid was then generated using Microsoft's Excel spreadsheet, in which the numbers one to six appeared randomly, provided by the RANDBETWEEN function. The motifs are then placed according to where their numbers fall on the grid. The negative spaces in this design, i.e. those between the motifs, appear as horizontal and vertical lines, clearly showing the grid structure.

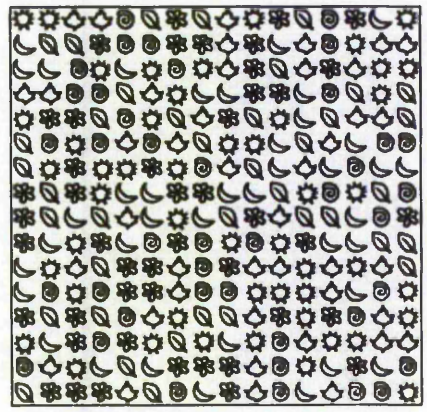


Figure 3

To combat this problem, another series of designs were produced in which the motifs deliberately linked with each other, regardless of their position. Figure 5 demonstates this. This is a three element design, developed in the same way as figure 1. Each motif, shown in figure 4, has a protrusion at the midpoints of each side of the grid square it fills. The square grid is still observable in this design, in both the negative spaces and in places where the same motif appears together several times.

Figure 4

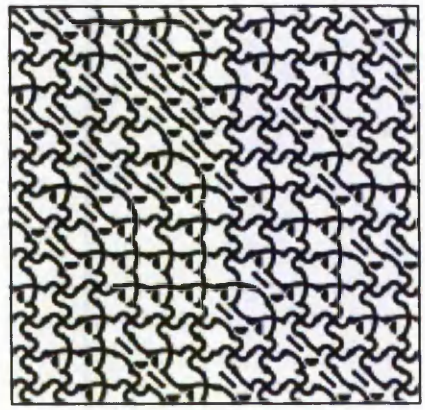


Figure 5

By using a hexagonal grid, rather than a square one, the repeat effect becomes akin to a half-drop, rather than a block repeat. The intention is to further disguise the grid, which, as mentioned earlier, the half-drop normally does.

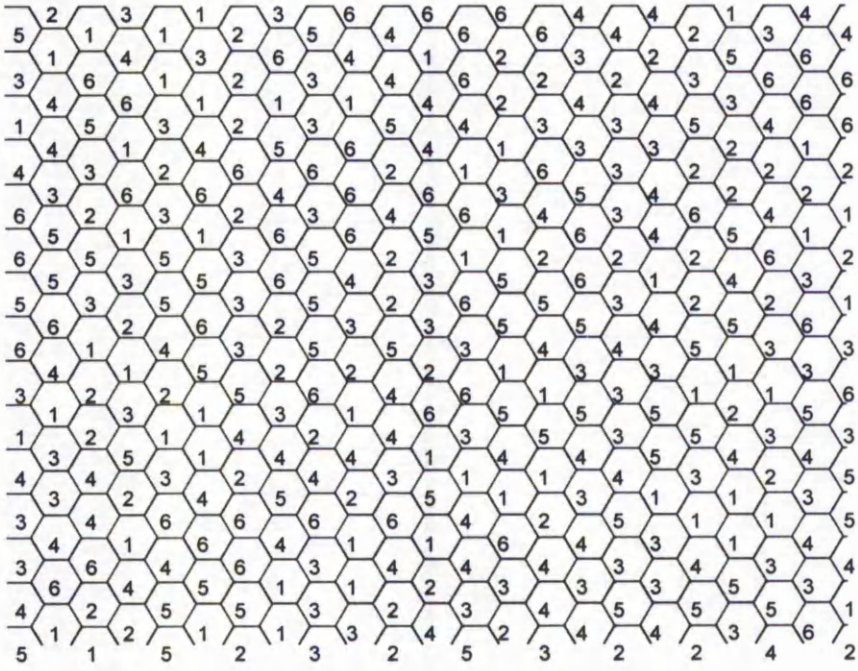


Figure 6

The number placement for a hexagonal grid design is shown in figure 6. In this example a single motif was constructed representing leaves and stems, as shown in Figure 7. The motif has protrusions at each of the hexagon's six vertices, ensuring that the resultant design has continuity and an organic feel. Figure 8 shows how this single motif would appear if placed in a standard half-drop repeat on the hexagonal grid.

Figure 7

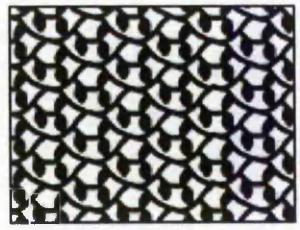


Figure 8

Though the original single motif had a creeping organic feel, this is lost when placed in the half-drop formation. The pattern has a uniform appearance akin to fish scales and, indeed, appears similar to a traditional type of design, known as a scale pattern. Obviously, if the motif were rotated in several different ways and locked together to form a larger repeating unit, this problem could be alleviated. However, figure 9 shows the finished random design, in which the motif is rotated in multiples of sixty degrees, according to numbers shown on the hexagonal grid displayed in figure 6. This design has an overall continuity, and retains the feel of a repeating pattern, without the rigidity of figure 8. The erratically recurring shapes and formations cause fascination to the viewer.

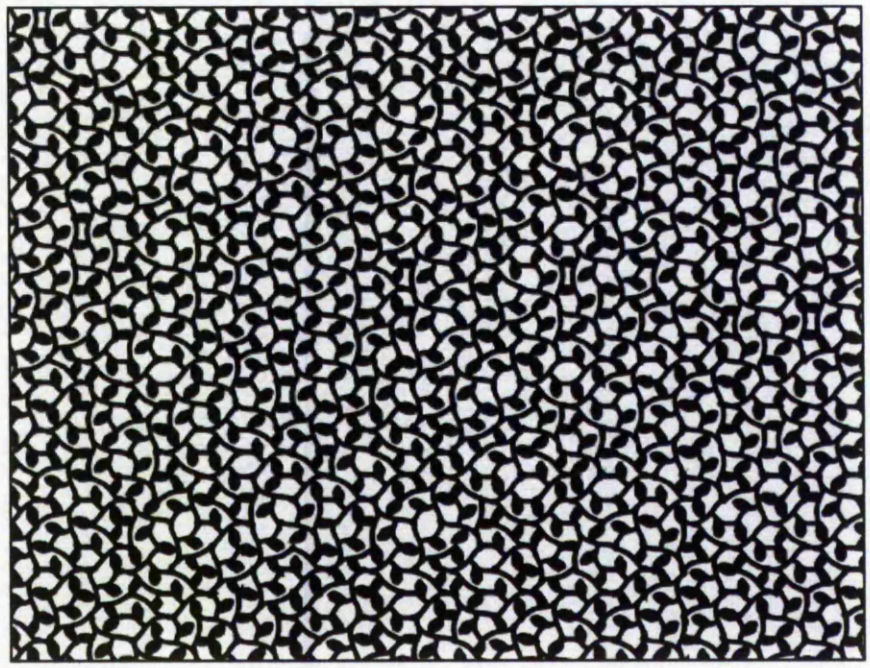
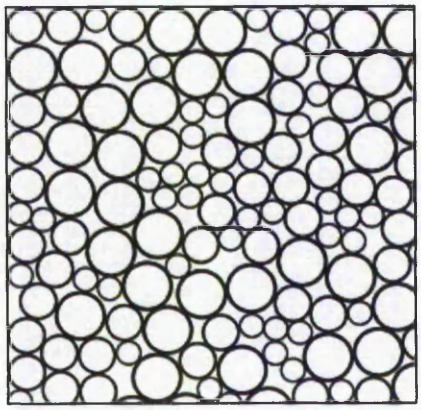


Figure 9

Figure 10 and Figure 11 provide further examples of methods to eliminate the rigidity imposed by a grid structure, in fact neither example is built on a grid. Figure 10 uses a table of random numbers from 1 to 3, each representing the size of a circle. The circles are then placed in the design filling from left to right, top to bottom, the circles are allowed to move up as far as possible, so as to touch the circles above and to the left of them. The identification of a single row or column becomes more difficult as the design grows. In Figure 11 co-ordinates are produced from random numbers, with an extra number to denote the circle diameter. Circles are then placed on the design according to the size and location given by the spreadsheet.



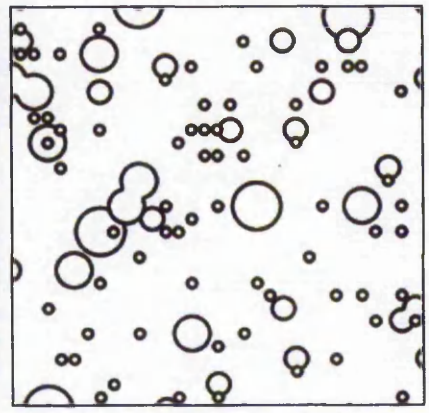


Figure 10 **Figure 11**

Conclusion

Historically, repeating designs for textiles have been a commercial, and mechanical neccessity, and have provided the framework in which most textile designers work. The production of individual, non-repeating designs has remained a luxury only found at the top end of the market. Within the next ten years it is possible that ink-jet printers for fabric will be developed for the production market. When this becomes a reality, the limitation of the repeating design is removed.

This work looks towards a future of textile design which enables the spontaneous creation and printing of designs such as those illustrated above, on to fabric. It can be hoped the utilisation of technology in this way will lead to innovation in textile design without the usual commercial overheads.

References

1. Bunce G. Point Art & Design Research Journal, Number 2, Summer 1996, pp 33-36
2. Gombrich, E.H. The Sense of Order, Phaidon, UK, 1979, p11

Need I Repeat Myself?

Non-repeating computer-aided designs for Printed Textiles

Hilary Carlisle

Biography

Hilary Carlisle is currently writing up her PhD research at The Nottingham Trent University. Her first degree, in Mathematics and Computing, was followed by six years in commercial computing. A major career change led her on to an MA in textile design from Central St Martins. She is a freelance textile designer and visiting tutor at Central St Martins and The Nottingham Trent University, teaching Visual Culture and Cultural Studies to undergraduate and postgraduate students in all design disciplines

Abstract

Historically, repeating patterns have been a technological and commercial restraint of mass-produced printed textiles. However, we have a natural desire to find, or make, patterns and order in many aspects of our visual lives, making many repeating patterns pleasing to the eye.

Now that the technology has the capability to produce lengths of fabric directly from computer to ink-jet printer, both the technological and commercial restraints are being lifted. This paper addresses the possibilities for non-repeating patterns on fabric, investigating both the practicalities and design considerations through the use of examples created in my own practical research. As the designer and programmer of the software I have been able to produce designs which look intriguingly like they may repeat, but in fact, never do.

Keywords

Textile Design; CAD/CAM; Random; Pattern; Repeat

Introduction

This paper is an analysis of the practice-based portion of my PhD research, which is currently being written up. The original aims of my research, entitled 'Towards a New Design Strategy: A Visual and Cultural Analysis of Small-Scale Pattern on Clothing', are as follows:

- To examine the visual qualities and socio-cultural issues associated with small-scale patterns used for clothing.

- To seek socio-cultural explanations for historical variations in small-scale pattern design used for clothing.
- To explore the potential of a new design strategy for printed fashion textiles, using the information from above in conjunction with computer randomising techniques.
- To produce textile designs for clothing which embrace the philosophical and creative concepts of the project.

These are fulfilled by exploring the socio-cultural associations of wearing pattern on clothes through identification of specific visual qualities such as: motif; angularity of line; rigidity and monotony of the pattern repeat structure. The practical side of the work investigates new ways and styles of producing patterns on textiles through the use of computer technology. The research idea was originated, and funding secured, by Gillian Bunce of the Nottingham Trent School of Art and Design, whose own PhD and continuing research explores the visual qualities of small-scale pattern and investigates new possibilities with CAD.

I begin by giving a broad overview of the discussions within my thesis. Following that I provide background to my own design work by discussing the historical and contemporary issues surrounding commercial textile design and manufacture, together with the human fascination for pattern. This contextualisation then forms the basis for explaining and describing the design innovations of the project. In conclusion I highlight the value of the project and identify areas for possible further investigations.

Overview of Thesis

Throughout the twentieth century some styles of pattern have been stereotypically linked to gender, the most obvious in the Western world being floral patterns for women and geometric patterns for men. The feminine has long been associated with the natural, while the masculine is linked to the cultural or constructed. It is a relatively trivial step to map descriptive words for patterns onto these poles: organic, meandering and curved are adjectives which apply to most floral designs while their opposites: constructed, angular, and structured, suitably describe many geometric designs. The polarity, or binary opposition, was identified by structuralists as the most basic system of categorising. It is usual, in this type of system, that one pole is prioritised over the other. Many feminist authors adopt this structuralist approach to show that most polarities can readily have the masculine/feminine opposition mapped onto them. It then becomes clear that it is the masculine pole that is prioritised side of the duality which in turn contributes towards the reinforcing of subordinate female gender roles.

The 'flowery frock', is an example which has become synonymous with a subjugated and enfeebled version of femininity that many women have been seeking to leave behind since the end of the 1960s. In order to do so, particularly in the business environment, pattern on clothes became minimal, particularly in the last two decades of the previous century. More recently pattern on clothing has featured heavily both on the catwalk and the high street. It will be interesting to see whether this is a short term fashion 'blip' or an indication of a more long term shift towards pattern.

Since the 1960s, when structuralism was at the height of its popularity, authors have challenged the notion that all thinking is done through a series of oppositions. I would argue that the categories we use to make sense of the world are far more fluid and diverse now than in previous times; even gender is now often considered more as a continuum from feminine to masculine, than as a polarity.

The repeating structure, used in most commercial textile printing, can be seen as a symbol of order that was previously required by both aesthetics and the printing technology. As society has challenged the rigidity of binary categories, so the inherent order of a repeating pattern can be challenged. Similarly, digital technology challenges the commercial printing options of the textile manufacturer.

The aim within my design work is to explore the stereotypes and dualities within the elements of pattern design and produce ambiguous and polysemic designs that are less prone to stereotyping. In particular, the design work explores the possibilities of disorder and randomness. This is not necessarily an attempt, or even a desire to create androgynous designs for clothing, but rather to produce an aesthetic that no longer harbours the stereotypically negative connotations of many traditional feminine patterns. Difference can still be referenced, particularly through the design elements, colour and scale.

By combining technology with creativity, this design work removes the repeating structure from textile design, hence allowing a less biased combination of the order and geometry with disorder and nature to produce a new design aesthetic.

Commercial Considerations

Mass-produced fabrics almost always contain a repeating element to their pattern design. The mechanisation processes of weaving, knitting and printing patterns have made this a necessity for the majority of textile production. The warp and weft structure of a woven fabric, and the stitch structure of knitted fabric lend themselves perfectly to geometric-style repeating patterns. While there are no such concrete boundaries for printed fabric, economy favours repeating patterns. At present mass-

produced printed fabric is still usually produced by separately printing each colour, via rotary or flatbed screens, on to the fabric. Using a repeating pattern reduces the number of screens or rollers required and the amount of skill and time to produce the fabric.

Commercial mass-productions of printed textiles began in the eighteenth century, and by the nineteenth century much emphasis was placed on the pattern repeat. By the beginning of the twentieth century writing on classifying pattern (Jones, 1856; Meyer, 1894) and directions on how a designer might produce a pleasing pattern (Christie, 1910; Day, 1903) were commonplace. As anyone who has produced a tiled background for their web page or Windows Desktop will know, a motif that appears attractive in isolation may become unattractive in repeating formation. Often horizontal, vertical or diagonal emphasis appears which one may not anticipate through observing the single motif.

Obviously, stripes, checks, and rigidly structured designs are sometimes demanded by fashion. A bold repeat can be incorporated into the design of the garment. For example, a striped fabric could be used horizontally on the sleeves and vertically on the body of the garment, or diagonally to produce a chevron effect. Garments produced this way are distinctive and quite different in appearance to ones made from the same pattern pieces in a plain fabric, or one without a heavily repetitive design. The disadvantages of this technique are twofold: more skill is required by the pattern cutter to align the pattern pieces to the fabric and there is more wastage in the fabric itself.

Time and economy became more and more valuable in the textile industry, as with most industry, as the twentieth century progressed. This led to a move away from obviously repeating patterns to ones in which the pattern is disguised or inconsequential. A pattern of this nature allows pattern pieces to be placed in any direction on the fabric, cutting down on wastage. If a motif is scattered across the repeating unit, in seemingly random directions, there is less chance that the repeat will be obvious (Bunce, 1996, pp33-36). Similarly, if a large repeat unit is used with large, but similar motifs covering most of the fabric's surface, the repeat can be hidden. This is a consequence of the pattern pieces within the garment not incorporating more than one repeat of the pattern while the similar motifs provide an overall uniformity which prevent the garment seams being obvious, however the fabric is cut.

The latter part of the twentieth century also saw a backlash against the perfection made available through the use of technology and high-level mechanisation. Whereas

in the early days of mass-produced printed fabric, the most sought after prints were those which appeared most perfectly printed, we now have manufacturers who deliberately incorporate faults to give fabric a 'hand-crafted', and hence desirable, look. Furthermore, there is now a trend towards 'uniqueness' and customisation in clothing.

The development of ink-jet printers, similar in principle to those used for colour printing on to paper, has been slow. Some additional requirements that account for this are: the ability handling different cloth types with varying pile length and fibre shedding; a necessity to use inks or dyes which can be made colourfast; speed; and fineness of jets. However, commercial ink-jet printers for fabric are now available and it is anticipated will enter mainstream fabric printing within the next five to ten years (Partridge, 1999, pp24-26). This enables the commercial production of non-repeating textile designs, fed directly from computer to printer. The printed textile designer is effectively released from the shackles of both colour reduction (necessary for screen printing, and usually limited to less than ten colours for fashion) and repetition. This opens up possibilities for new and innovative textile designing. New design challenges become apparent: for example, how could a designer produce a non-repeating design for a commercial 300 metre length? Theoretically, a digital image this size could be constructed and sent to the printer, however, the physical size of the digital file it would be stored in would require a computer with a huge amount of hard disk space and memory[1]. It would also be a very time consuming task to create the whole design, not unlike the task of hand-painting a 300 metre roll of paper. If repetition is not to be used, some form of automation would be necessary to aid filling the space.

As will be discussed below, the aim of this design work was to consider this challenge by investigating the creation of designs that take individual motifs and manipulate them in varying ways via a computer program, culminating in lengths which do not follow the normal rules of repeating structures. Before discussing the design work further, I wish to clarify definitions of pattern and repetition and discuss the value of pattern to the human mind.

Pattern, Repetition and Randomness

Pattern is often taken to simply mean repetition, as Justema (1972, p19) says 'In the minds of many people, that's all there is to it.' In defining pattern as 'a design composed of one or more devices multiplied and arranged in orderly sequence' Christie (1910, P1) doesn't limit himself to strict repetition as the foundation, but more as an

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[1] At present, even a file of 1m x 2m at a resolution of 100 pixels per inch takes up 88.7Mb in Adobe Photoshop, making it unwieldy and slow for an average Pentium computer with 128Mb of memory.

element of pattern construction. In her doctoral thesis, Bunce (1993) describes pattern as an ordering of chaos, emphasising how the cultural definitions of both two shift over time.

Repeating patterns have long been the norm in textile production and the commercial reasons for this have already been discussed, but there are also important aesthetic ones. The structuralist view is that it is an inherently human desire to order, categorise and separate into distinct classifications, and while structuralism is now viewed more as a tool than a solution to life, it is indisputable that ordering and categorising are human traits. This desire extends to vision, where patterns are sought and created in the images around us. Mathematician Ian Stewart sees symmetry, and hence repeating patterns, as something 'our brains seem especially able to grasp and manipulate' (1993, p257). Other studies have shown it is much easier for people from Western cultures to remember a symmetric pattern than a random one (Deregowski, 1980, p59). So it would seem that to remove the repeating structure of a pattern entirely might alienate or confuse the viewer.

Phillips and Bunce (1993, p7) go as far as to say that repeat structures are 'crucial element of pattern design', defending the statement by emphasising that a design needs organisation and structure. But repeating structures can vary from the banal to the over-elaborate, as Gombrich (1979, p11) states 'The monotonous may fail to register while the intricate may confuse'. In general, patterns intrigue us, but a balance between boring and over-complicated needs to be found.

As stated in the thesis overview, it would appear that contemporary society is generally more open to fluidity in classification, hence less rigidity in pattern design may well also be acceptable. Justema (1972, 25) states that 'although repetition is what makes a pattern a pattern, variation is what makes a pattern rewarding'. As we gain understanding of a regular pattern from experience, we become open to new stimuli. Albarn (1974, p20) describes it as 'a state of receptivity and "imbalance" – a dynamic state of "flow"'. It is this "imbalance", or unstable equilibrium that the design work is seeking to harness.

> This aesthetic is a fusion of intellect and intuition, analysis and synthesis, a fundamental, dynamic order present in the physiology of the brain. (ibid. p62)

Introducing elements of chance, or randomness into their work is a concept that has excited many artists, from the unpredictable splash of paint in Jackson Pollock's work, to the more contrived use of chance in which dice throws or coin tosses are used to

determine elements of the work. Two artists whose work is most relevant to this project are John Maeda (2000) and Paul Brown (2001, online). Both artists have used computer technology to enable them to create images in which some parameters are determined by the computer program. Though neither artists were familiar to me at the start of the project, their work and the surrounding issues bears some striking similarities. However, coming from a fine art perspective perhaps allows them more freedom with their finished images, than would be acceptable in a commercial textile environment, for the reasons discussed below.

As far as it has been possible to establish, there is no other current research linking computer-aided randomness with textile design. Other interesting and relevant work in the field of fashion and textiles comes from Kath Townsend, researcher at the Nottingham Trent School of Art and Design, whose practical work explores engineered printed garment design from a three-dimensional perspective, developing a simultaneous approach to fabric printing and cutting. This allows non-repeating designs to be drawn on to the garment pieces in such a way as to allow seam matching, so that the final design appears to wrap seamlessly around the garment.

It would appear that both randomness and repetition are concepts that fascinate the human mind. Both the commercial and aesthetic considerations discussed above show that there is certainly a case for requiring structure in pattern. However, it has also highlighted the fact that strict repetition is no longer required, or in many cases desired, as this design work demonstrates. The design examples discussed below use elements of repetition such as similar motifs and uniform positioning, however random parameters are introduced to avoid uniformity.

Design Method and Examples

Designs which contain a balance between order and chaos, which have repeating elements, but do not conform to the classic requirements of a repeating structure, and which look fascinating rather than boring, satisfy the theoretical, aesthetic and commercial issues which have been discussed above. The computer programming of some design elements was used as a tool towards fulfilling these criteria.

Subversion of an opposition leads to an unstable equilibrium in which neither pole is dominant. By identifying gendered oppositional qualities in textile patterns and utilising them in a non-oppositional way the design examples create this unstable equilibrium. The major opposition that is explored throughout the work is order vs. chaos. While order might be considered the dominant feature of contemporary mass-produced textiles, invoking chaos would merely overturn the polarity. These design examples

show subversion rather than inversion and utilise other masculine/feminine mapped polarities such as angular/curved and organic/geometric within their imagery.

Aesthetically, balancing chaos and order could provide the intrigue necessary to produce fascinating patterns that give continuing visual pleasure. But how acceptable or wearable could random designs be? While using random techniques can give the desirable quality of uniqueness, it could also lead to garments from some areas of the fabric being more desirable than others, due to colour changes or motif placement. Once again, a balance between uniformity and uniqueness needed to be found.

Commercially the fabric would require a fairly even spread of motifs: if the program was allowed to draw motifs at random co-ordinates there may be areas of closely situated, or even over-lapping motifs, and other areas with no motifs at all. Similarly, if the design contained lines that were free to randomly wiggle in any direction, they may well wiggle off the fabric print. In a third case, if the motif is allowed to stretch or contract randomly, it may quickly degrade after a series of concurrent contractions or stretches. While samples of any of these design types may provide aesthetically interesting one-off pieces, it is unlikely that they could be commercially viable as long lengths.

It must be made clear then, that the introduction of a random element to the designs is simply that – an element. No pretensions are made to true randomness, and no attempt or desire to 'computer generate' designs - in the sense that the computer is in control – has been made. The computer program is in fact a tool by which the design ambitions have been speedily realised.

In the early part of the project design ideas were all executed through a combination of manual and computer-driven techniques. Firstly the design inspiration was explored and converted into possibilities dependant on randomness. Secondly, a method of generating random options was needed. This was supplied by using the random number function[2] within Microsoft's spreadsheet package, Excel. The advantages of this over a more manual method, e.g. coin tossing or dice throwing, were that the number of different options available was infinitely variable, a grid of options was easy to produce, and reproduce with different options, and of course, speed of production.

However, manual manipulation of the motifs was extremely time consuming, and this became a limiting factor in the size of the finished product. Instead, the computer

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[2] In Microsoft's spreadsheet package Excel, the function RANDBETWEEN(lowest,highest) gives a random number from the lowest to the highest supplied as parameters

programming language, Visual C++, was used to develop more automated procedures in which the designs were conceived and drawn. This gave the ability to produce designs of, (theoretically), limitless size. Another advantage was that the designs could be generated and sent straight to the printer, obviating the need to store large files on the hard drive. As the images generated were now vector-based, the computer memory used to process them was also much smaller than the equivalent raster-based image, improving printing times.

The program does not generate designs in the sense that a designer is no longer required. Indeed, at present, each design is effectively hard-coded into the program, though once coded it will appear differently each time it is generated, due to the random parameters inserted in the code. Speed was an obvious advantage of this method: once the initial code had been written designs of large size were quickly produced. Fascinating designs of three types have been produced, all of which have different features, but in their own way satisfy the criteria of striking a balance between order and chaos. They are grid based, progressive and co-ordinate based.

Grid Based

In these design examples, the grid provided cells in which one or more motif could be placed. The random function of the program chooses which motif, or in some cases which alignment of the motif as the design sometimes consists of only one motif rotated through the symmetry points of the grid unit.

The simplest form this type of design takes is a square based grid with one motif that is either present or absent (Fig. 1a). These designs do have one of the problems identified above, however, in that it is theoretically possibly, if unlikely, that the fabric could have large spaces, devoid of motifs. By increasing the number of motifs, and disallowing absence as an option this problem is removed. However, it was found that regardless of the number of different motifs, or types of motif, the grid structure was easily perceivable to the eye, even when it could only be identified in the form of the negative spaces between the motifs (Fig. 1b).

One method of lessening this effect was to use motifs whose corner points sometimes linked. This provided a cohesion and organic quality to the designs while reducing the visibility of the rectangular structure (Fig. 1c). Another method was to use a tessellating shape other than a rectangle for the grid structure, using this method, the eye is less drawn to the repeat. For example, a hexagonal, or honeycomb grid producing the effect of a half drop repeat (Fig. 1d). Even a rectangle, or square in a half drop or brick format lessens the emphasis on structure. (Carlisle, 1999, p203)

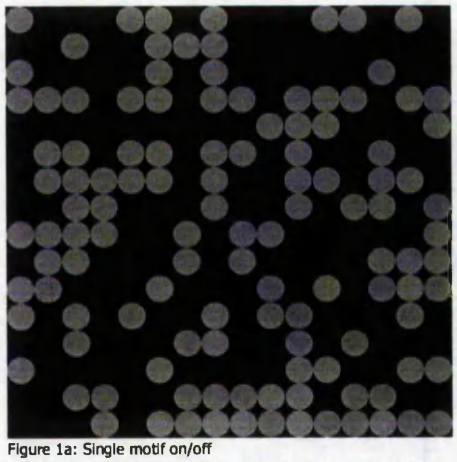


Figure 1a: Single motif on/off

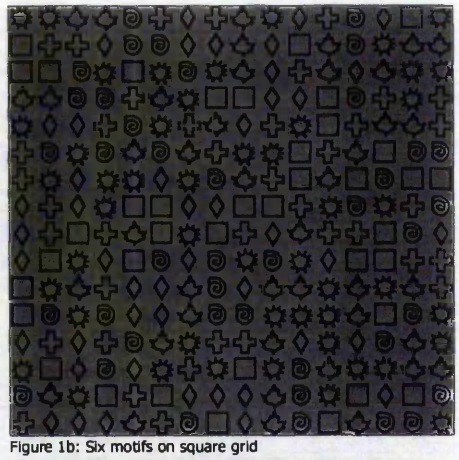


Figure 1b: Six motifs on square grid

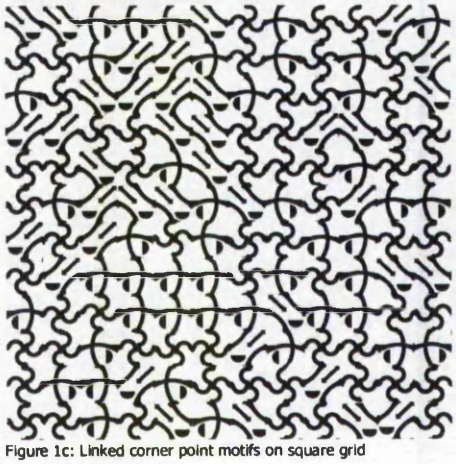


Figure 1c: Linked corner point motifs on square grid

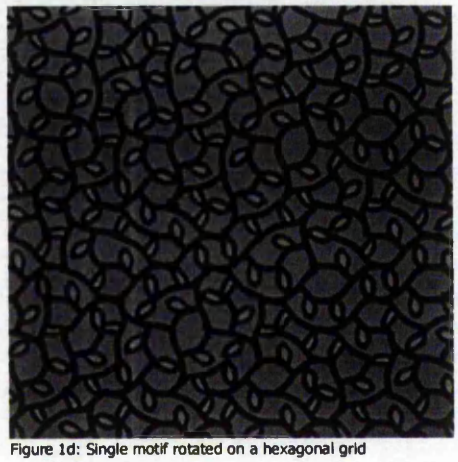


Figure 1d: Single motif rotated on a hexagonal grid

Progressive

These designs can be distinguished by a 'striped' effect. The motif repeats across the top of the design, and is then manipulated by stretching, squashing, or repositioning. Unlike the grid-based designs, each manipulation is dependent on the previous one, i.e. rather than taking the basic motif each time; the previously manipulated motif above has the manipulation applied to it in order to produce the next motif in the column. While these designs have a necessary uniformity, based on the their columnar nature, it is not as pronounced as the square-based grid. Examples are linear motifs which begin vertically but are allowed to meander by taking angles of 45 degrees to the left or right (Fig. 2a) and circular motifs that are allowed to stretch or squash into ellipses (Fig 2b). Restricting parameters are required to prevent motifs degrading or meandering off the designs. For example, if one manipulation such as a motif squash was repeated contiguously several times that column of the design may degrade.

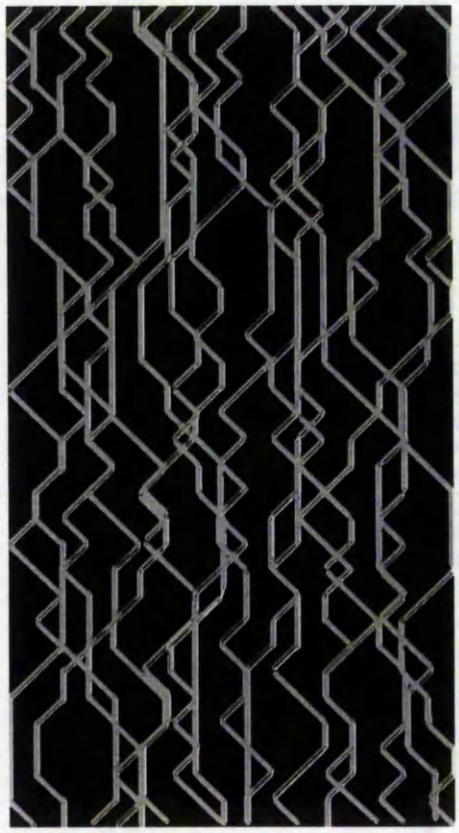


Figure 2a: Linear progression

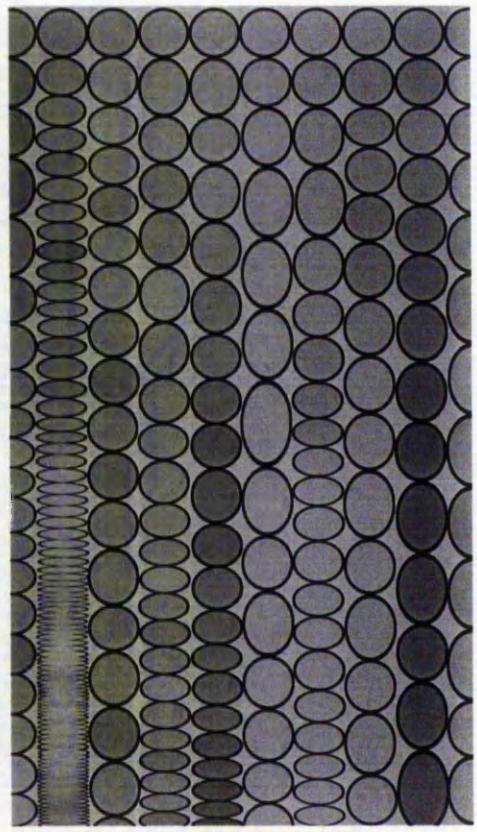


Figure 2b: Circular progression showing degradation

Co-ordinate Positioning

The third type of design example eliminates the inherent structure of the previous types by randomly positioning the design elements. Each motif is designated co-ordinates within the frame of the design space. The co-ordinates are randomly decided. Restricting parameters are used to prevent the motifs appearing outside of the design space. Further parameters are used to limit the number of motifs within the design space (Fig 3a). The advantage of this method is that no base grid can be located by eye. The disadvantages are that it would be possible to have large empty areas, or heavily over-populated areas (Fig. 3b). The former becomes less likely as the size of the frame and number of motifs increase. The latter can be controlled with extra restricting parameters that prevent a motif appearing in the same space as an existing one.

Using the computer program to generate grid-based designs enabled more complex designs to be produced (Fig. 4). Once the motif size and shape has been programmed, extra parameters can easily be added to vary line width and colour.

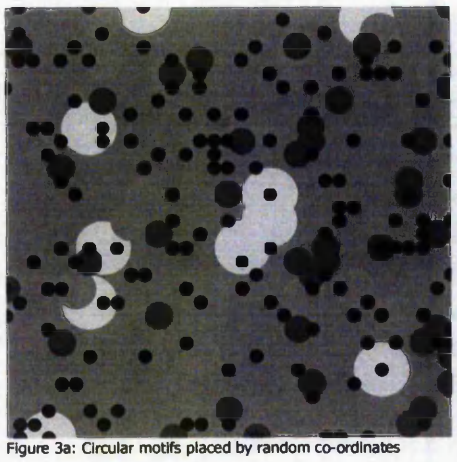


Figure 3a: Circular motifs placed by random co-ordinates

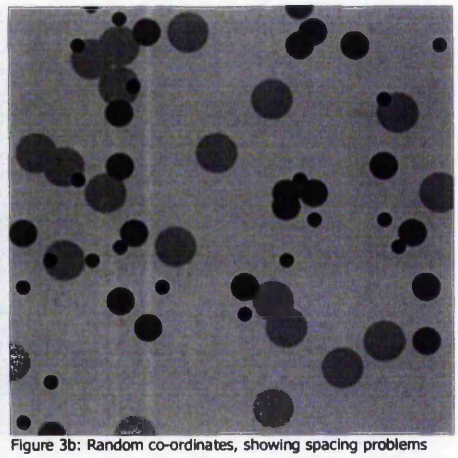


Figure 3b: Random co-ordinates, showing spacing problems

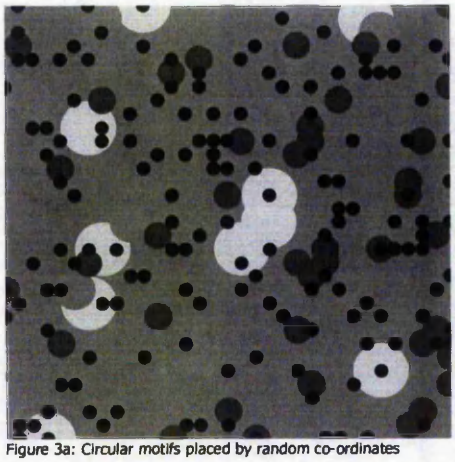


Figure 3a: Circular motifs placed by random co-ordinates

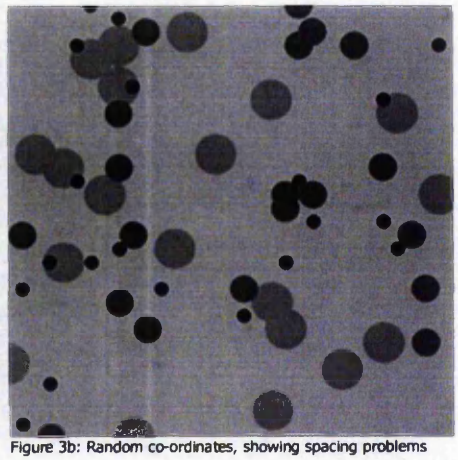
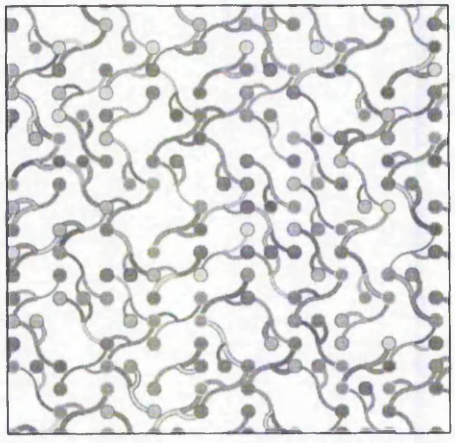


Figure 3b: Random co-ordinates, showing spacing problems



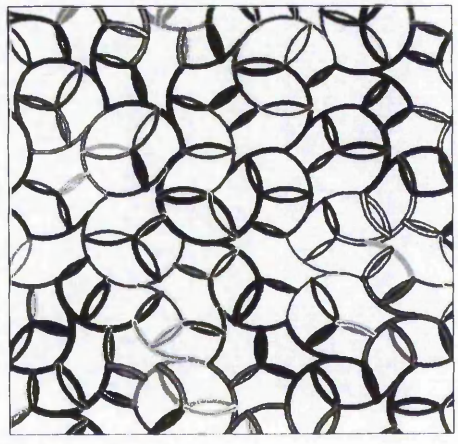


Figure 4. Two complex grid-based designs generated by computer

Conclusion

The aim of this project was to look for a new strategy for textile design by investigating social and cultural theory, pattern, and technological and commercial viability. In producing these design experiments all of these elements have been considered. The design examples have an aesthetic which does not conform to the stereotypes usually seen in commercial textile design, thereby freeing the wearer to choose pattern without feeling the restrictions of having to conform to a particular

gendered, or otherwise, role. They combine elements of order and chaos; angularity and curvaceousness; and organic and geometric, without prioritises one over the other. They also satisfy our human desire to look for and make pattern in our visual world; they are neither too complicated as to be confusing, nor too simple as to be boring. Technologically and commercially, this method of design creation will soon be a viable alternative to traditional processes. By using restricting parameters within the computer program, the tendency towards an uncommercially chaotic design has been reduced, and in some cases avoided.

Currently, the designs have been only been executed on paper, not fabric, though it is hoped that this will be the final stage of the project. Also, at present, the computer program is simply a prototype, which requires the designer to have programming skills in order to create a new type of design. However, the idea could easily be expanded to produce a 'designer friendly' software package in which the designer could draw or import their own motifs, and select options of positioning, rotation and manipulation in order to create unique designs.

Most of the problems encountered in the developing of designs have been due to lack of programming experience in Visual C++. Some of the initial design ideas proved beyond my programming ingenuity, though it is worth mentioning that it was not the original intention for me to develop the software, but rather to initiate and develop the ideas. My computer programming background allowed me to take things a little further. Through collaboration I am confident that the software could be expanded to its full potential.

An initial investigation into fabric ink-jet printing suggests that most commercial systems require images to be filtered through their own printer driver software. As the random design software currently prints directly through the standard MS Windows driver to avoid having to create and store a very large computer file, this is could be seen as another potential difficulty. Again, it is envisaged that collaboration will resolve this issue. It is to be hoped that printed textile manufacturers will embrace the removal of the limitations in colour and repetition that screen-printing embodied and continue design experiments in the search for new textile aesthetics.

By eradicating the repeat, these design experiments allow the balance between order and chaos to be battled out within the flow of the design itself. As Albarn (1974, p62) says, 'Pattern is qualitative, the whole possessing characteristics not owned by the parts.'

References

Albarn, K. (1974) *The language of pattern*, Thames & Hudson, London

Brown, P. (2001) http://www.paul-brown.com

Bunce, G. (1993) *An investigation of CAD/CAM possibilities in the printing of textiles*, PhD Thesis, The Nottingham Trent University

Bunce, G. (1996) The unexploited potential of new technology for repeat pattern innovation in printed textile design, in *Point: Art & Design Research Journal*, Number 2, pp 33-36

Carlisle, H. (1999) Breaking the monotony: using randomisation techniques in computer-aided textile design in Paton, R, and Neilson, I. (eds.) *Visual representations and interpretations*, Springer-Verlag, London, pp203-208

Christie, A. H. (1910) *Traditional methods of pattern design*, reprinted as Pattern Design, Dover Publications, New York,

Day, L. F. (1903) *Pattern design*, Batsford, London: (reprinted 1915)

Deregowski, J. B. (1980) *Illusions, patterns and pictures: a cross-cultural perspective*, Academic Press, London

Gombrich, E.H. (1979) *The sense of order*, Phaidon, UK

Jones, O. (1856) *The grammar of ornament*, reprinted 1972 Van Nostrand-Reinhold, London

Justema, W. (1972) *The pleasure of pattern*, Reinhold Book Corporation, New York

Maeda, J. (2000) *Maeda and Media*, Thames & Hudson, London

Meyer, F. S. (1894) *A handbook of ornament*, reprinted 1974 Duckworth, London

Partridge, S. (1999) Digital textile '98: Como and beyond, in *Image magazine*, Feb/March 1999 Vol. 11 No. 1

Phillips, P. & Bunce G. (1993) *Repeating patterns*, Thames & Hudson, London

Stewart, I. & Golubitsky, M. (1992) Fearful symmetry: is God a geometer?, Penguin Books, London

Bibliography

Books

Adams R & David S (eds) 2002 The masculinity studies reader Oxford: Blackwells Publishers Ltd

Albarn K et al 1974 The Language of pattern London: Thames & Hudson

Anscombe I 1984 A woman's touch: women in design from 1860 to the present day London : Virago Press

Ash J & Wilson E (eds.) 1993 Chic thrills: A fashion reader California: University of California Press:

Attfield J 1989 'FORM/female FOLLOWS FUNCTION/male: Feminist Critiques of Design' in Walker J A Design history and the history of design London: Pluto Press pp199-225

Barnard M 1996 Fashion as communication London: Routledge

Barnard M 1998 Art, design and visual culture Basingstoke: Macmillan Press

Barnes R & Eicher J B (eds) 1993 Dress and gender: making and meaning Rhode Island: Berg Publishers

Baudot F 1999 A century of fashion London: Thames & Hudson

Benjamin W 1992 Illuminations London: Fontana

Betterton R 1987 Looking on: Images of femininity in the visual arts London: Pandora

Beynon J 2002 Masculinities and culture Buckingham: Open University Press

Bleier R 1984 Science and gender: A critique of of biology and its theories on women New York: Pergamon Press

Bowlt J E 1989 Costume revolution London: Trefoil

Brédif J 1989 Toiles de Jouy: Classic printed textiles from France 1760 -1843 London: Thames & Hudson

Briggs J 1992 Fractals : the patterns of chaos - discovering a new aesthetic of art science and nature London: Thames and Hudson

Brush Kidwell C & Steele V (eds) 1989 Men and women: dressing the part Washington: Smithsonian Institution Press

Butler J 1999 Gender trouble: feminism and the subversion of identity (10th anniversary edition) London: Routledge

Calloway S 1992 Liberty of london: masters of style and decoration London: Thames and Hudson

Chadwick W 1996 Women art and society London: Thames & Hudson

Chapman D 1998 Teach yourself Visual C++ 6 in 21 days Indianapolis: Macmillan Computer Publishing

Christie A H 1969 Pattern design : an introduction to the study of formal ornament 2nd Edition New York: Dover Publications

Clare A 2000 On men: Masculinity in crisis London: Chatto & Windus

Cole S 2000 Don we now our gay apparel: Gay men's dress in the twentieth century Oxford: Berg

Connell R W 1995 Masculinities Cambridge: Polity Press

Connikie Y 1990 Fashions of a decade: the 1960s London: Batsford

Costa J A (ed.) 1994 Gender issues and consumer behaviour California: SAGE Publications

Crichton M 1991 Jurassic Park London: Arrow

Davies C 1975 Permissive Britain: social change in the sixties and seventies London: Pitman Publishing

Davis F 1994 Fashion culture identity London: Chicago University Press

De la Haye A & Wilson E (eds.) 1999 Defining dress: Dress as object meaning & identity Manchester: Manchester University Press

Deregowski J B 1980 Illusions patterns and pictures: a cross-cultural perspective London: Academic Press

Downes B & Miller S 1998 Teach yourself media studies London: Hodder & Stoughton

Eagleton T 1990 The ideology of the aesthetic Oxford: Blackwell

Eisenstein H & Jardine A, (eds.) 1994 The future of difference New Jersey: Rutgers University Press

Entwistle J 2000 The fashioned body Cambridge: Polity Press

Gaines J & Herzog C (eds.) 1990 Fabrications: costume and the female body London: Routledge

Gamman L & Marshment M (eds.) 1988 The female gaze: women as viewers of popular culture London: The Women's Press

Garner P 1996 Sixties design Cologne: Taschen

Glennon L M 1979 Women and dualism: a sociology of knowledge analysis New York: Longman

Gombrich E H 1979 The sense of order Oxford: Phaidon

Goodman C 1987 Digital visions : computers and art New York: Abrams

Gray J 1993 Men are from Mars women are from Venus London:HarperCollins

Gray J 2001 Mars and Venus in the workplace London: HarperCollins

Green J 1999 All dressed up: the sixties and the counterculture London: Pimlico

Greer G 1971 The female eunuch London: Granada Publishing Ltd

Harding J (Ed) 1986 Perspectives on gender and science East Sussex: The Falmer Press

Harvey J 1997 Men in black London: Reaktion Books

Haste H 1993 The sexual metaphor London: Harvester Wheatsheaf

Haweis E 1978 The art of beauty and the art of dress London: Garland Publishing

Hefford W 1992 The v & a's textile collection. Design for printed textiles in england from 1750 to 1850 London: V&A Museum

Herald J 1992 Fashions of a decade: the 1970s London: Batsford

Hewison R 1986 Too much: art and society in the sixties 1960-1975 London: Methuen

Hulanicki B 1983 From A to Biba London: Hutchinson

Ikoku, N 1999 The V&A Museum's textile collection: British textile design from 1940 to the present London: V&A Publications

Jackson L 1998 The sixties: decade of design revolution London: Phaidon

Jeffries, J (ed) 2001 Reinventing textiles: gender and identity Winchester: Telos Art Publishing

Justema W 1972 The pleasure of pattern New York: Reinhold Book Corporation

Kaiser S B 1997 The Social Psychology of Clothing: Symbolic appearances in context 2nd edition revised USA: Fairchild Publications

Kidwell C B & Steele V (eds.) 1989 Men and women: Dressing the part New York: Smithsonian Institute Press

Kimball G (ed) 1981 Women's culture: the women's renaissance of the seventies London: Metuchen

Kirkham P (ed) 1996 The gendered object Manchester: Manchester University Press

Konig R 1973 The restless image: a sociology of fashion London: George Allen & Unwin Ltd

Lauwerier H 1991 Fractals : images of chaos London: Penguin Press

Leach E 1985 Levi-Strauss London: Fontana (first published 1970)

Lechte, J 1994 Fifty key contemporary thinkers: from structuralism to postmodernity London: Routledge

Lobennthal J 1990 Radical rags: fashions of the sixties New York: Abbeville Press

Lurie A 1981 The language of clothes London: Hiedmann

Maeda J 2000 Maeda @ Media London: Thames & Hudson

Malossi, G (ed) 2000 Material man: masculinity, sexuality, style New York: Harry N Abrams, inc

Marwick A 1998 The sixties Oxford: Oxford University Press

Masters B 1985 The swinging sixties London: Constable

McRobbie A 1991 Feminism and youth culture: From jackie to just seventeen London: Macmillan

Mendes V & De la Haye A 1999 20th century fashion London: Thames & Hudson

Mellor S & Elffers J 1991 Textile designs London: Thames & Hudson

Moir A & Moir B 1999 Why men don't iron London: Harper Collins

Norris C 1987 Derrida London: Fontana Press

Norris C & Benjamin A 1988 What is deconstruction? London: Academy Edition

Pavia T & Costa J A 1994 'Gender Dimensions of the Alphabetic Characters with Implications for Branding' in Costa J A (ed.) Gender issues and consumer behaviour California: Sage Publications pp185-228

Pease A & Pease B 1999 Why men don't listen and women can't read maps: New York: Pease International:

Penrose R 1997 The large, the small and the human mind Cambridge: Cambridge University Press

Phillips P & Bunce G 1993 Repeat patterns London: Thames & Hudson

Pinker S 1998 How the mind works London: Penguin Press

Plant S 1998 Zeros and ones London: Fourth Estate

Polhemus T & Procter L 1978 Fashion and anti-fashion: An anthropology of clothing and adornment London: Thames & Hudson

Pollock G 1988 Vision and difference: femininity feminism and histories of art London: Routledge

Radner H 2001 'Embodying the Single Girl in the 1960s' in Body Dressing Entwistle J & Wilson E (eds.) Oxford: Berg pp183 - 197

Ribeiro A 1988 Fashion in the french revolution London: B T Batsford Ltd

Rothstein N (ed) 1996 Four hundred years of fashion: Victoria & Albert Museum London: Victoria & Albert Museum

Rouse E 1989 Understanding fashion Oxford: BSP Professional Books

Rowbotham S 1973 Hidden from history: 300 years of women's oppression and the fight against it London: Pluto Press

Rowbotham S 1990 The past is before us: Feminism in action since the 1960s London: The Penguin Group

Rowbotham S 2000 Promise of a dream: remembering the sixties London: Penguin Group

Schoeser M & Rufey C 1989 English and American textiles from 1790 to the present London: Thames & Hudson

Sharpe S 1994 Just like a girl: How girls learn to be women from the seventies to the nineties London: Penguin Press

Singh S 1998 Fermat's last theorem London: Fourth Estate

Sparke P 1995 As long as it's pink: The sexual politics of taste London: Pandora

Sphar C 1999 Learn Microsoft Visual C++ 6.0 now Washington: Microsoft Press

Springer & Deutsch 1993 Left brain, right brain New York: W H Freeman

Stewart I 1989 Does God Play Dice?: the Mathematics of Chaos Oxford: Basil Blackwell

Stewart I. & Golubitsky M 1992 Fearful symmetry: is God a geometer? London: Penguin Books

Strinati D 1997 An introduction to the theories of popular culture London: Routledge

Tseëlon E 1995 The masque of femininity London: Sage Publications

Turner G 1996 British cultural studies: An introduction (2nd edition) London: Routledge

Walker J A 1989 Design history and the history of design London: Pluto Press

Ward G 1997 Teach yourself postmodernism London: Hodder & Stoughton

Wheen F 1982 The sixties: A fresh look London: Century Publishing

Wilson E 1985 Adorned in dreams: Fashion & modernity London: Virago

Wilson E 1988 Hallucinations: life in the post-modern city London: Radius

Wilson E 2001 The contradictions of culture: Cities culture women London: Sage Publications

Woodham J 1997 Twentieth century design Oxford: Oxford University Press

Journal Articles

Bem S L 1974 'The measurement of psychological androgyny' Journal of Consulting and Clinical Psychology Vol 42 No 2 pp153 - 162

Bunce G 1996 'The unexploited potential of new technology for repeat pattern innovation in printed textile design' in Point: Art & Design Research Journal Number 2 pp33-36

Evans C 1998 'The golden dustman: a critical evaluation of the work of Martin Margiela and a review of *Martin Margiela: Exhibition (9/4/1615)*' Fashion Theory Vol 2 Issue 1 pp73 – 94

Gardner M 1970 Mathematical Games: The fantastic combinations of John Conway's new solitaire game "life" in Scientific American 223 (October 1970): 120-123 available at: http://ddi.cs.uni-potsdam.de/HyFISCH/Produzieren/lis_projekt/proj_gamelife/ConwayScientificAmerican.htm

Gill A 1998 'Deconstruction Fashion: The making of unfinished decomposing and re-assembled clothes' Fashion Theory Vol 2 Issue 1 pp25 – 50

Gilligan C & Attanucci J 'Two moral orientations: gender differences and similarities' Merrill-Palmer Quarterly vol 34 no 3 pp223-237

Graham R & Spencer J 1990 'Ramsey Theory' Scientific American July 1990 pp80-85

Haraway D 1998 'Situated knowledges: the science question in feminism and the privilege of partial perspective' Feminist Studies Vol 14 no 3 (fall 1998) pp575 -599

Hearle J 1993 'Computer-aided textile design: the problem of three cultures' Textile Horizons vol 13 no 5 October 1993

Huff K A 1999 'The Application of Non-Periodic Tiling Patterns in the Creation of Artistic Images' in Siggraph Computer Graphics Annual Conference Series 1999 p209

Johnson K & Workman J 'Effect of clothing, sex and sex role stereotypes on behavioural expectations of a preschool child' Clothing & Textiles Research Journal Vol 11 No 2 pp1-6

Kaiser S B 1996 'Ethnicity Gender and Sexuality: Fashioning Global Textiles' Textile Institute 77th World Conference Proceedings Vol 1 (2) pp281-294

McWhinnie H J 1993 'Chaos theory: some questions of symmetry and randomness in art and design IV' Design Methods: Theories, Research, Education and Practice vol 27 no 2 pp1783-1789

Morgado M A 1996 'Coming to Terms with Postmodern: Theories and concepts of contemporary culture and their implications for apparel scholars' Clothing & Textiles Research Journal Vol. 14 No 1 pp43-53

Oliver B Dallas M & Eckman M 1998 'Communication of empirical knowledge: an investigation of readability and quality of research in textiles and apparel' Clothing & Textiles Research Journal Vol. 16 No 1 pp27-35

O'Neill A 2000 'John Stephen: A Carnaby Street presentation of masculinity 1957 – 1975' Fashion Theory Volume 4 issue 4 pp487-506

Steele V 1997 'Anti-fashion: The 1970s' Fashion Theory Volume 2 issue 3 pp279-296

Steinhardt P 1997 'Crazy crystals' New Scientist 25/01/1997 pp32 - 35

Uji H 2001 'The Effect of Digital Textile Printing Technology on Textile Design Styles' available at :http://www.techexchange.com/thelibrary/DTP-textileDesign.html

Voss D 1999 'Smash the System' in New Scientist 27/02/1999 pp44-46

Wilson E 1990 'Deviant dress' Feminist Review Summer 1990 pp67-74

Newpaper and Magazine Articles

Abrams, F 1998 'Non-fiction tempts boys to catch up with the girls' Independent, 06/01/1998, p5

Alexander, H 2002 'The Elegant, ethnic alternative' Daily Telegraph, 12/03/2002 accessed online at: http://www.dailytelegraph.co.uk/fashion/main.jhtml?xml=%2Ffashion%2F2002%2F03%2F12%2Fefeth11.xml

Allan G 1971 'Don't be shirty but are you sure you look as well as you could?' Daily Mail, 23/3/1971

Andreae S 1998 'Desire: It starts in your genes, not in your jeans' Independent on Sunday, Real Living Section p5, 15/11/1998

Anon 1967 'Tailpiece' Herald Express, 15/6/1967

Anon 1969a 'Fashion for the Young at Heart' Gloucester Citizen, 27/11/1969

Anon 1969b 'Florals added to Van Heusen's new 'fashion' range' Style for Men Weekly, 12/11/1969

Anon 1970 'Colourful Trend in Men's Clothing' Cheshire Observer, 8/5/1970

Anon 1971a 'Something to put your shirt on' The Sunday Times Business News, 17/10/1971

Anon 1971b 'Prophecy and Gloom for the peacock' The Guardian, 24/5/1971

Anon 1972 'Back to the Button-Down' Time Magazine 10/1/1972

Arlidge, J 1999 'Boys behaving badly', The Guardian, Unlimited section, 14/03/1999 accessed online at: http://www.guardian.co.uk/Archive/Article/0,4273,3837070,00.html

Boyle R 1970 'There's quite a rosy haze on the shirt front these days' Manchester Daily Express, 12/9/1970

Brown, Z 2000 'Prints Charming' fashion spread, The Independent on Sunday, Reality Magazine, 19/11/2001, pp10-12

Burchill, J 1998 'The age of reason: I knew I was smart' The Guardian Weekend, 04/04/1998, p7

CC 2001 'Can real men wear pink?' The Sunday Times Style Magazine, 22/07/2001, pp8-9

Chesshyre R 1998 'Boys vs girls' The Telegraph Magazine, 30/05/1998, pp47-51

Chiswick L 2000 'Painting by Numbers' in The Independent Magazine, 7/10/2000 pp26-29

Cordle L 2001 'Flower Power' fashion spread The Telegraph Magazine, 24/03/2001, p21

Crome E 1972 Men's Wear 19/10/1972, p19

Daniels A 1998 'Leave the housework to biology' Daily Telegraph, 18/07/1998, accessed online at: http://www.telegraph.co.uk/arts/main.jhtml?xml=%2Farts%2F1998%2F07%2F18%2Fboiron18.xml

Duncan L 2001 'High Colour' fashion spread The Independent on Sunday Magazine, 22/04/2001 pp28-31

Durrant C 2002 'Passion Flower' fashion spread Sunday Times Style Magazine, 24/02/2002, pp18-20

Dutter, B 1997 'Bottom-line fight over unique design' in The Daily Telegraph, accessed online at: http://www.dailytelegraph.co.uk/htmlContent.jhtml?html=%2Farchive%2F1997%2F04%2F12%2Fnpape12.html

Ellen, B 2001 'When big boys cry' The Observer, 25/03/01 accessed online at: http://www.guardian.co.uk/Archive/Article/0,4273,4158579,00.html

Forna A 1998 'Danger: Women at work' The Independent, Real Living Section, 4/10/1998, p5

Freeman H 2001 'In Detail' fashion spread The Guardian Weekend, 28/08/2001, p61

Gofton K 1969 'Colour brightens the shirtmakers' gloom' Financial Times 25/9/1969

Goldhi C 1972 'Shirt Deal' Men's Wear

Greenfield S 1998 'View from here' Independent Education Section p2, 16/7/98

Grenby J 1970 'The coloured shirt-and-tie revolution' Watford Evening Echo, 15/10/1970

Higginson S 1969 'Men's Fashion' The Times 12/12/1969

Highfield R 1998 'Why women fall for men with baby faces' Daily Telegraph, 27/08/1998 accessed online at: http://www.telegraph.co.uk/htmlContent.jhtml?html=%2Farchive%2F1998%2F08%2F27%2Fwldc27.html

Hill D 1999 'Talkin' 'bout my evolution' The Guardian, 07/10/1999, accessed online at: http://www.guardian.co.uk/Archive/Article/0,4273,3909791,00.html

Hill D 2000 'Under your skin' The Guardian, 17/11/2000, accessed online at: http://www.guardian.co.uk/Archive/Article/0,4273,4092288,0

Hughes J 2002 'Up with the larks to bed with the owls' The Guardian 11/04/2002, accessed online at: http://www.guardian.co.uk/Archive/Article/0,4273,4391089,00.html

Innes P 1970 'Out and About with Pam' The Cheshire Observer, 13/11/1970

Irvine S 2002 'Northern Lights' fashion spread The Sunday Telegraph Magazine, 24/02/2002. pp36-40

Jackson L 2002 'Great Lengths' in Crafts No.174 Jan/Feb 2002 pp26-31

Judd J 1998 'Macho attitudes key to boys failing' Independent, 25/07/1998, p6

King-Deacon A 1970 'Men's Fashion' The Times 6/3/1970

Kirwan-Taylor H 2001 'Women on Top' Sunday Times, Style section, 28/01/2001, p8

Kress G 1998 'The future still belongs to boys' Independent Education Supplement, 11/06/1998, pp4-5

Lacey H 1998 'What men and women do best' Independent on Sunday Real Life Section p1, 21/06/1998

Lambillon A 2000 'The autumnal feminine' fashion spread The Independent on Sunday Magazine, 20/08/2000, pp23-25

Leung J 2001 'Out of Africa' fashion spread The Guardian Weekend, 28/08/2001, pp56-60

Lightfoot L 1998 'Boys are left behind by modern teaching' Daily Telegraph, 5/01/1998, accessed online at: http://www.telegraph.co.uk/htmlContent.jhtml?html=%2Farchive%2F1998%2F01%2F05%2Fnlad05.html

McCartney J 2002 'A scare story by those who hate women' The Daily Telegraph 17/02/2002 accessed online at: http://www.dailytelegraph.co.uk/opinion/main.jhtml?xml=%2Fopinion%2F2002%2F02%2F17%2Fdo1705.xml

Mckie R 2001a 'Revealed: the secret of human behaviour' Observer, 11/02/2001, accessed online at: http://www.observer.co.uk/uk_news/story/0,6903,436553,00.html

Mckie R 2001b 'Men and women behaving badly? Don't blame DNA' Observer, 11/02/2001, accessed online at: http://www.guardian.co.uk/Archive/Article/0,4273,4134598,00.html

Millington L 1970 'If your man steals the show – steal his shirt' Birmingham Post, 13/10/1970

Mott S 2001 'Women are still underachievers in sport' The Daily Telegraph, 28/09/2001 accessed online at: http://www.dailytelegraph.co.uk/sport/main.jhtml?xml=%2Fsport%2F2001%2F09%2F28%2Fsomott29.xml

O'Donnell K 2002 'Living: Parallel Lines', Vogue, April 2002, pp288-291

Partridge S 2000 'Potential for Digital Textile Printing: Garment Decoration; Flags & Banners' Conference paper at The IMI Digital Printing Conference 2000. Available at: http://techexchange2.com/pp/DPPotential/DPGmntFlag_BannerPot.htm

Partridge S. 1999 'Digital textile '98: Como and beyond' Image Magazine Feb/March 1999 Vol. 11 No. 1 pp24-26

Pizzey E 2001 'Give us lasses, not ladettes' The Daily Telegraph, 18/08/2001, accessed online at: http://www.dailytelegraph.co.uk/family/main.jhtml?xml=%2Ffamily%2F2001%2F08%2F18%2Ffmlass17.xml

Rickey M 2001 'In print' Nova May 2001 pp36-39

Ridley Y & McLaughlin J 1999 'Official: Women really are top bosses' The Independent on Sunday, 26/09/1999, p3

Robson J 2002 'Power to flower suits' The Daily Telegraph, 22/03/2002, accessed online at: http://www.dailytelegraph.co.uk/fashion/main.jhtml?xml=%2Ffashion%2F2002%2F03%2F22%2Fefflo22.xml

Sayer T 2001 'Petal Power' fashion spread The Sunday Express Magazine, 15/07/2001, pp22-24

Shulman A 2002 'Style notebook: folk chic' The Daily Telegraph, 15/01/2002, accessed online at: http://www.dailytelegraph.co.uk/fashion/main.jhtml?xml=%2Ffashion%2F2002%2F01%2F15%2Fefshul15.xml

Smithers R 2000 'Woodhead attacks 'vacuous' degrees' The Guardian Education Unlimited Section 14/08/2000 available online at: http://education.guardian.co.uk/ofsted/story/0734839228100.html

Walter N 2001 'Who says that girls will be girls?' The Independent 25/06/2001 accessed online at: http://www.independent.co.uk/story.jsp?story=79908

Watson S 1998 'Pretty women' Marie Claire March 1998 pp170-171

Worsley K 1998 'Foucault: Will Naomi Wear it?' The Times Higher Education Supplement 3/4/1998

Conferences and Symposia

Visual Representations and Interpretations 1998 University of Liverpool

Design History Conference 1998 University of Huddersfield

Pixel Raiders 2002 V&A Museum, London

The Fashioned Word 2002 London College of Fashion

Exhibitions

The Cutting Edge: Fifty Years of British Fashion, 1947 – 1997 March 1997

Mondrian, Tate Gallery, London, June 1997

Paul Smith: True Brit, Castle Art Gallery, Nottingham, May 1997

The Warhol Look: Glamour Style Fashion, Barbican Centre, London, June 1998

Addressing the Century: 100 Years of Art & Fashion, Hayward Gallery, London November 1998

Vivien Westwood, Barbican Centre, London, May 1999

Men in Skirts V & A Museum April 2002

Interviews

Verostko R 2001 Interview conducted by e-mail. 10/09/01

Internet

Amazon 2002 Amazon UK Online Bookstore available at: http:www.amazon.co.uk accessed 11/3/2002

Bauer A 2001 The Gallery of Random Art available online at: http://gs2.sp.cs.cmu.edu/art/random/ accessed 20/07/2001

BBC 2000 'Granada Sales Jump' on BBC News available at: http://news.bbc.co.uk/hi/english/business/newsid_1046000/1046978.stm

Brown P 1996a Looking at *the Ceiling* first published in Imprint the quarterly journal of the Print Council of Australia Vol. 31, No. 4, pp21-22 available at: http://www.paul-brown.com/WORDS/CEILING.HTM

Brown P 1996b Emergent Behaviours: towards computational aesthetics first published in Artlink Vol. 16, Nos. 2 & 3, July 1996, available at: http://www.paul-brown.com/WORDS/EMERGENT.HTM

Brown P 1999 Flesh Tones available at: http://www.paul-brown.com/GALLERY/GALL90/FLESH.HTM

Brown P 2000a English Summer available at: http://www.paul-brown.com/GALLERY/GALL90/ENGLISH.HTM

Brown P 2000b Time-based work: Chromos available at: http://www.paul-brown.com/GALLERY/TIMEBASE/CHROMOS/INDEX.HTM

Huff K A 1999 The Artwork of Kenneth A Huff, image 99.1 available online at: http://www.itgoesboing.com/ImageInformation/99.1.html

Huff K A 1999 The Artwork of Kenneth A Huff, image 2000.27 available online at: http://www.itgoesboing.com/ImageInformation/2000.27.html

Huff K A 2002 The Artwork of Kenneth A Huff, available online at: http://www.itgoesboing.com

Lindblad 1998 Comments on tilings and quasicrystals available at: http://www.theophys.kth.se/mathphys/SYM/tilings.html

Stork 2002 Information on the Amethyst Printer, available at: http://www.storktextile.com

TopMan 2002 TopMan WebSite available at: http:www.topman.co.uk accessed 10/04/2002

Verostko R 1988 Epigenetic Painting: Software As Genotype, A New Dimension of Art (*Presented at the First International Symposium on Electronic Art, 1988 (FISEA'88)*) available online at: http://www.verostko.com/epigenet.html accessed 20/07/01

Verostko R 2001 Algorithmic Fine Art , exhibition at Arizona State University at Tempe, USA, available at: http://www.verostko.com/shows/tempe/tempe.html

Television and Radio

Hill H (prod.) 1998 Sex Bomb Channel Four series

Lee J (prod.) 1993 'Whatever Happened to the Sixties?' The Late Show BBC

Moir A (prod.) 1998 Why men don't iron Channel Four series

Mortimore M (prod.) 1997 Royal Institute Christmas Lectures presented by Ian Stewart BBC

Penrose R 2000 'Desert Island Discs' introduced by Sue Lawley, BBC Radio 4

Unpublished Works

Bunce G 1993 An investigation of CAD/CAM possibilities in the printing of textiles, PhD Thesis, The Nottingham Trent University

Carlisle H 1995 Stereotypes and Contradictions: Women's Roles and Women's Clothes, unpublished MA Thesis, Central St Martins College of Art and Design. London