

University of Leeds

Ars Textrina

International Textiles Conference

Natural Fibres - A World Heritage

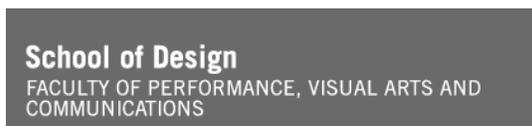
In celebration of
'The International Year of Natural Fibres'

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In association with:



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Day One

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Silk Ikat Velvet Weaving in Uzbekistan

Barbara Setsu Pickett

This paper considers the traditions and current practice of silk ikat velvet weaving in Uzbekistan. Various museum collections were examined and various experts in the field were consulted prior to field work in various silk weaving centres of the Ferghana Valley in Uzbekistan. There much was learnt from master dyers and weavers. This is part of a wider-ranging project, involving much practice and testing and focused on the history of silk velvet weaving since around the mid-twentieth century.

A Fresh Look at the Linen in the Hebrew Bible

Nahum. Ben Yehuda

Linen and lamb's wool are the two fibres predominant in the Bible. This study will concentrate on linen. First, a brief overview of the Biblical synonyms for this material and their respective philological backgrounds will be made. Specific applications of terms and end uses (in fibrous, yarn, cord, net or fabric form) will be considered.

Special focus will be put on the priestly vestment "Kutoneth" (tunic, chiton, coat).

This is the only linen item for which the Bible provides specification regarding its construction, i.e. "of checker work" (Exodus [Revised Standard Version] chapter 28, verses 4 and 39.) Explanation of the "checker work" specification will be approached from various perspectives, taking into account the technological capabilities contemporary to antiquity in the Land of Israel and its surrounding region, and striving to avoid the "projective identification" of modern values and sensitivities into ancient society.

A. Production (1. Fibre: quality and yarn weight and construction. 2. Colour: shade of flax/linen. 3. Weave: pattern.)

B. Design (characteristics and rationale) Includes 1. Comfort: perspiration transmission, coolness and warmth, softness. The priests work in the Holy Temple in Jerusalem outdoors, year-round. 2. Good appearance: concealment of creases, and of ash, blood or oil stains. 3. Identity: use as a uniform for the priests ["Kohanim"] in order to differentiate them from the Levites working concurrently in the Temple. 4. Semiotics: the message of the checker work.

Sources consulted will include ancient literary works, classical and modern Bible exegesis, iconographic and archaeological findings, textile engineering and textile design research.

Simply Red
Eugene Nicholson

This paper is concerned with the legacy of Turkey Red as seen in the characteristic shapes, method of preparation and social functionalism discovered in Egyptian times and continuing well into the 19th century.

The aim of this paper is to throw light on some of the key features and developments associated with this hitherto unknown collection held in the Colour Experience, previously known as the Colour Museum.

These deposited samples now form an important addition to the textile collection held at the Bradford Industrial Museum.

**Spaniards, Indians, Traders, andMuslims? International Influence in
American Southwest Style**
Patricia Williams

There is ample documentation for the ebb and flow of popular interest in the artistic products of Native Americans. Over time, they were elevated from the status of utilitarian objects, to exotic souvenirs, and finally to works of art (Gordon and Herzog, 1988). This presentation will discuss how a Native American textile has become an icon of the interior design style known variously as American Southwest Style, Santa Fe Style, Hispanic Style, and Spanish Mission Style.

The style has several components, but the best known is the colourful Navajo rug. Its appearance in home magazine photographs alerts decorators, veteran and novice alike, to the presence of the style. These geometrically-patterned weavings, well-known in today's art market, conjure up romantic images linked to the south-western area of the United States, to Native American and Hispanic people, and to the homes occupied by cowboys and ranchers in film and on television.

A significant change to Native American weaving occurred in the 16th and 17th centuries when Spanish settlers and missionaries introduced domestic sheep, and wool replaced native cotton. Outside influence also brought change to the simple striped weavings of pre-Contact times. Spanish design, deeply infused with the Islamic motifs of Spain's Moorish conquerors, found expression in the New World through the development of the Mexican Saltillo serape and in the blankets of the Rio Grande settlements. Diffusion via trade and conquest added this patterning to the design vocabulary of the Navajo (Jeter, and Juelke, 24).

The Santa Fe Railroad completed a route through the American Southwest in 1887 and began conducting what it called “Indian Country Tours”. The railroad also contracted with White traders to supply souvenir shops along the route and markets on the East Coast with Navajo blankets and rugs (Dockstader, 24). Machine made cloth had by this time replaced the hand weaving tradition in areas outside of the Southwest, leaving the Southwest in possession of an exploitable skill for the burgeoning tourist industry.

Early commercial attempts failed because the heavy demands of the traders resulted in poor quality and the designs did not appeal to White customers. They resolved the issues of craftsmanship and also devised new “Indian designs” which they felt would make the rugs and blankets more saleable to the non-Indian buyer. These designs, Islamic in origin, were a simplified version of the Turkish rugs then popular in American homes. The Navajo eventually also made rugs incorporating symbols from their own culture, a feature which had never been part of their weaving tradition (Appleton, 114).

Magazine photographs of rooms designed today in Southwest Style reveal that many floor coverings are of Islamic origin or wall-to-wall carpeting with generic “Indian designs”. This may be due to the status Navajo rugs have gained as art objects. Rugs from Asian countries are moderately priced, while Navajo weavings are thought too valuable to walk on. Traditional Islamic motifs are not out of place: they harmonize with the Southwest Style, and further, have a place of their own in America’s design history.

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Session papers (Abstracts)

Possum Fibre – From Invasive Pest to Luxury Product Sandra Heffernan

This research reveals the impact of a new fibre development, possum, in New Zealand. The introduction of possum to New Zealand, their impact on the environment, specific characteristics of the fibre, and properties of products for a range of markets is discussed.

Introduced in the early 1900s to New Zealand the Australian Brush tail Possum (*Trichosurus vulpecular*) is a pest with no natural predators. It was a protected species until 1938 when significant damage to indigenous flora and bird life was detected; forests were devastated by the possum. Since then the New Zealand government has taken measures to control possum.

In the early 1990s Phyllis Huitema created the idea of blending possum with merino wool. Then Woolyarns Ltd. developed the idea into a commercially viable yarn at their factory in Lower Hutt, initially for use in the manufacture of apparel for the tourist market.

Complemented with merino wool, possum/merino and possum/merino/silk blend fabrics provide desirable properties for luxury brands. Manufacturers note a greater acceptance of possum in the luxury market place. Increasing acceptability in international markets has led to development of new products including knitting yarn and woven home ware products.

The Potential for Using Indigenous Cecropia Silk in North America: A Natural and Sustainable Fibre

Teena Jennings-Rentenaar

The Cecropia moth is a large moth that resides in most of the area east of the Mississippi River, but is prevalent in the Appalachian foothills in the United States and the southern portions of Ontario in Canada. When the wings are fully expanded they can reach a size of 18 cm across from wing tip to wing tip and 13 cm in height. An adult moth of this size would, predictably, have a large cocoon and indeed it does, measuring up to 8 cm in length.

Breeding techniques have been perfected that essentially just “borrow” the female to lay eggs for 3 of the total 10 days in a confined space. The female lays the rest of the eggs in the wild. The confined eggs are permitted to hatch. The larvae are fed for their entire growing period and then space is provided for them to spin their cocoon. The female cocoons are identified by size and retained while the male cocoons are placed in the wild. Later, the emerged females will mate with wild males or some of the “returned” males. This description of the lifecycle of the moth points to the fact that these moths are raised in harmony with the wild population.

The cocoons are somewhat stiff and papery due to the “glue” or, more correctly, the sericin that the larva uses to adhere the fibre together while forming the cocoon. With careful experimentation, the optimal pH level to remove the sericin efficiently while not damaging the fibre has been achieved. Subsequent studies have shown that the fibre is as lustrous, fine and strong as the cultivated silk that comes from the *Bombyx mori*. The natural colour tones of the Cecropia silk have attractive variations ranging from soft buttery colours, to taupe and soft pink undertones. In addition, this wild silk dyes as readily and brilliantly as the cultivated silk.

The successful breeding program combined with the facts that the fibre is both useable and attractive forces us to consider the questions of a viable industry. This presentation will examine the lifecycle of the Cecropia, using photographs of the various stages. Then, it will examine the techniques used for processing to ensure maximal fibre yield and quality. Finally, we will consider the major hurdles to developing a successful industry and the research that is ongoing.

Khadi – Fabric for Future Consumption
Bhargavi Patel and Mehga Vyas

Khadi which is hand-spun and hand-woven fabric deals with natural fibres as cotton, wool and silk, can boast of being 100 percent natural and, when dyed with natural dyes, makes a perfect combination for a green fabric. Khadi, over the decades has moved from a freedom fighter identity fabric, which is pride of India, to a fashion fabric. Today's generation, who exposed to an International scenario, is highly fashion conscious, so the designers go in for Indo-western fusion which is the most accepted blend today. Hence, the investigator, keeping in mind the need of the hour, is to revive the age old khadi fabric by improving upon its aesthetic value using various surfaces ornamentation techniques, and bring it to fashion scene by promoting the designs through a webpage, which has become an effective and economic means of advertising

Further to finding out the details about the created designs, fabric and its aesthetic appeal, use of surface ornamentation techniques and its acceptability, the designed and constructed outfits were subjected to fashion indoor photography on live models required for the development of webpage's which were subjected to evaluation and the responses noted.

Horrockses Fashions and Cotton Ready-to-Wear, 1946 – 1960

Christine Boydell

'Horrockses Fashions' was one of the most well respected ready-to-wear labels of the late 1940s and 1950s. It was established in 1946 as a subsidiary of Horrockses Crewdson & Company Limited, the Preston-based cotton manufacturer, and produced women's day and evening wear, beach clothes and housecoats from high quality cotton cloth, using fashionable styling and custom-designed fabrics. At this time cotton was associated with cheap, practical clothing, hardwearing sheets and children's wear. Silk was the fabric of choice for haute couture with rayon favoured for ready-to-wear.

The paper examines two neglected areas of dress history: fashion fabrics and ready-to-wear, and explores the strategies adopted by Horrockses Fashions to transform the fortunes of cotton as a fashion fabric. The *raison d'être* behind the launch of the company was the sale of the parent company's cotton cloth. The decision to focus on good quality ready-to-wear with attention paid to fashionable styling, fabric design and finish was a promotional strategy made in order to help elevate the status of cotton and in turn increase Horrockses Crewdson's sales of cotton cloth to clothing manufacturers.

During the 1940s and 1950s there were a number of initiatives to elevate cotton's status to a fashionable fabric, particularly in terms of the activities of the Cotton Board in Manchester and its Colour, Design & Style Centre. This paper argues that Horrockses Fashions were a vital player in this enterprise, and in terms of ready-to-wear, they did more than any other company to transform the fortunes of cotton as a fashion fabric. Reactions to their first collection emphasised the glamour of cotton and the fabric designs used were compared to those normally seen in more sophisticated fashions made from silk. The paper will examine the strategies behind the launch of the company, the

promotional campaigns adopted in order to raise the status cotton, and the attention paid to fabric design.

The importance of fabric design to the use of cotton was a key to success; they acquired designs from a number of sources including in-house staff, commercial design studios, freelancers and also from well-known artists such as Graham Sutherland and Eduardo Paolozzi. They were applied to the parent company's high quality cotton sheeting which was reserved exclusively for Horrockses Fashions. In order for cotton to be accepted for ready-to-wear fashions it was crucial that it should be easy to maintain, so Horrockses utilized treatments such as crease-resistant finishes as well as processes that eliminated shrinkage and improved washability. The latter was particularly important since the cotton fashions were faced with creeping competition from emerging fabrics such as nylon.

The research is based on a rich variety of primary sources, including company business records, museum and archive collections, interviews with Horrockses' personnel and with consumers, as well as contemporary trade and consumer magazines.

The Ewart Liddell Archive – Irish Heritage **Kate Wells**

The linen industry is an integral part of the history of Northern Ireland and its decline has left a huge scar on the population, prosperity and remaining culture of the area. An important part of this heritage is the Ewart Liddell Company, one of the world's most substantial privately owned linen manufacturers of its time and the largest linen Jacquard-weaving company in Ireland. The company and factory site played an important role in the economic and social history of the northern part of Ireland.

Established in 1973 when the two historic Northern Ireland linen companies united: William Ewart and Sons, a Belfast based linen company (founded in 1814), and William Liddell and Company which started in 1866 in Donaghcloney. In their prime, the two founding companies produced quality damask linen products and customised linen for the top international hotels and for the White Star line (famously associated with RMS Titanic and her sister ship Olympia). This company became part of the Coats Viyella Group but was sold in 2001 to Baird McNutt. Changing its name to Liddell Ltd, the name lives on as a sales and marketing company a subsidiary of Hilden Ltd.

Today the factory is closed and virtually derelict, with the prominent original building of William Ewart & Sons in the centre of Belfast standing empty and in bad state of repair. A survey in 2007 of the old weave works located in Donaghcloney, Co. Armagh, Northern Ireland, revealed that most of the industrial heritage had been sold or destroyed but a large collection of old design plates was discovered within the abandoned factory. In order to preserve this historical legacy a disposal contract for the Ewart Liddell archive (a collection of approximately 1600 photographic design plates) was signed by Baird McNutt to allow Interface: A Centre for Research in Art, Technologies & Design within the School of Art and Design at the University of Ulster to host this material.

This paper covers the problems that have been encountered in the conservation of this collection and highlights the importance of preserving such a design collection. Recording the skill of the anonymous designers and weavers of this specialist field of textile production is of importance to the region and also to the documented history of woven textiles in general. The designs depicted on the plates are aesthetically rich in their own right but they also hold qualities as to the arduous and complex process of linen damask weaving and an insight into its commerciality. This archive illustrates the diversity of the original designers-draftsperson's skills pre-digital weaving. Although, mostly traditional in their style the plates show a strong amalgamation between traditional patterning, armorial crests and logos associated with their prestigious clients and the local area.

The initial stages of the preservation of the design plates presented a fragile series of stages. The entire collection of plates was in an un-stable state, unsuitable for further investigation and research. Each design plate needed meticulously cleaning before being digitally scanned, documented and stored in suitable atmospheric conditions necessary for their preservation. Preservation of this design collection, and the wealth of designs generated by the Ewart Liddell company, has enabled access to future textile historians, museum curators and designers and, importantly, it has provide an insight into the history of damask weaving and its past commercial success.

The Use of Cotton in Historical Turkish Textiles Cigdem Cini Senturk

Anatolia has always been a land of natural fibres; cotton, wool and silk have been widely available, and hemp and flax also but in lesser quantities. Textile production in Anatolia mostly made use of cotton, silk and wool in historical times. All three types of fibres were used by local industries and were also exported beyond the borders of Anatolia. Cotton as raw material was available in the south and south-eastern parts of Anatolia as well as the east. The cottage-based hand-weaving industry in villages and urban centres met the wide demand for cotton cloth. As Inalcik notes, during the period 1400-1600, not only luxury silks but also fine cottons were in the lists of the imports from Turkey to various European countries including France and Italy. Amongst these, 'kirbas', a coarse kind of cotton cloth as well as fine cottons named 'dülbent' were commonly used in domestic goods as well as garments*. The production areas for kirbas included north-eastern Anatolia, central Anatolia and western Anatolia. Besides the exports, imports were also received from India in the 16th century; these were principally fine cotton fabrics under various names such as 'bayrami', 'hammami', 'sherbeti', 'aladja', 'bogasi', and 'dülbent'.

Ottoman documents confirm a vast range of cotton fabrics in use at the time as well as blends with silk or linen commonly used in garments and home textiles in urban centres as well as villages. Uses included underwear, shirts, baggy trousers, caftans, kerchiefs, head covers, turbans, towels, bed spreads, door curtains and cushion covers.

* Inalcık, H., "Turk Tekstil Tarihi Üzerine Araştırmalar", Türkiye İş Bankası Kültür Yayınları, İstanbul, 2008

These cotton pieces were usually embellished with embroidery, needlework or block printing as in the case of head covers for women. Cotton cloth was especially the main type of fabric in peasants' clothing and domestic textiles. In urban centres, it was either used in underwear, accessories or linings. Embellishment with embroidery and needlework on cotton fabrics was noteworthy and showed rich symbolic expression as well as the use of a variety of techniques and materials. This paper examines the traditional use of cotton cloth in garments and accessories, as well as home furnishings, and also highlights the nature of embellishment and explores the relevant socio-cultural significance.

What Did the Egyptians Ever do for Bolton? Jacqui Hyman

Bolton, 9 miles north of Manchester, rapidly grew with the expansion of the textile industry in the 19th century, specialising in fine cotton spinning. By 1860 it had become the centre for fine spinning. The cotton industry was dominated by Lancashire, providing 50 per cent of the nation's exports of manufactured cotton goods. It was claimed that the Lancashire Mills produced enough cloth by breakfast time to satisfy local demands and the rest of the day could be devoted to export!

Problems arose from the embargo on cotton imports during the American Civil War, with the resulting so-called 'Cotton Famine' in Lancashire and the urgent need to find a suitable new supplier of long-stapled cotton yarn, ultimately culminated with the cotton manufacturers linking with cotton merchants in Alexandria, the Egyptian port on the Mediterranean.

Annie E.F. Barlow, youngest daughter of Bolton textile magnate James Barlow, began to take an interest in Egypt, travelling there first in 1887 with her brother to meet cotton merchants in Alexandria. She became Honorary Secretary of the Bolton branch of the Egyptian Exploration Society (EES), responsible for raising money to support its excavations. Bolton was one of the major supporters of the EES well into the 20th century and benefited from Annie Barlow's support, as excavators in Egypt were allowed to keep a proportion of their finds and the EES gave objects to institutions or collectors who had funded their work. Annie Barlow asked for her share of the finds to be given to the Chadwick Museum, the forerunner of Bolton Museum.

The work of William and Thomas Midgley (Curators of Bolton Museum) in the study of textiles and fibres gave Bolton an international reputation in this field. As a result, archaeologists offered Bolton Museum textiles from their excavations in return for an analysis of their finds. The Midgleys' work appears in many excavation reports and as a result the Museum's collection of Egyptian textiles, particularly from the "Coptic" period (c. 4th – 10th Centuries CE), is one of the most important in Britain.

**Natural Fibres Identified in Textiles Excavated in Greece by the Application of
Non-destructive Instrumental Analysis
Christina Margariti**

Written sources from ancient Greece contain numerous references to various natural fibres used in textile production. Tangible evidence can be found in excavated textile finds that have survived burial. The inherently sensitive nature of excavated textiles accounts for their rarity and poor condition, making fibre identification a challenge. Scientific analysis seems to be the solution to overcome this problem. The rarity and importance of the finds makes the selection of non-destructive techniques a fundamental prerequisite from an ethical viewpoint. In addition, this is enforced by a directive of the Hellenic Ministry of Culture applicable to all excavated finds. Therefore, environmental scanning electron microscopy coupled with energy dispersive spectroscopy (ESEM-EDS) and FTIR microscopy in reflectance mode were used for the analyses. These techniques were applied to three finds excavated in Greece and selected as examples of the most representative type of preservation, which is in association with copper.

The high magnifications afforded by the ESEM enabled the study of the morphological characteristics of the fibres, such as nodular thickening of cellulosic bast fibres, convolutions along cotton fibres, and triangular cross-sections in silk fibres. The application of the ESEM was successful in fibre identification even in cases where the actual fibres had not been preserved, as was the case with the surviving imprint of epithelial scale patterns of wool fibres on negative casts. The application of ESEM-EDS further confirmed such results by the detection of sulphur, which is a component of the amino acids in wool proteins. ESEM-EDS has the advantage of providing very precise analysis but is in general a time-consuming technique. FTIR microscopy, in reflectance mode, was able to produce good quality spectra, comparable to those produced by the reference samples, especially in the case of cellulosic fibres. FTIR analysis is fast and relatively easy, but a comprehensive reference library is necessary for the correct interpretation of the results. In general, the combination of more than one technique provided the most reliable results.

This research showed that fibre identification of excavated textile fibres, which more often than not are in very poor condition, can be achieved by the application of non-destructive instrumental analysis. Thus, the information present can be extracted, and subsequently disseminated, without destructing the physical integrity of these rare, yet important finds.

**The Traditional and Continued Use of Wild, Naturally Dyed Silk in Madagascar
Teena Jennings-Rentenaar,**

The Betsileo women of the central highlands of Madagascar have, for generations, collected and processed the indigenous, wild *Borocera* silk cocoons. They continue to use the same tools to spin and weave this silk into cloths called 'lambda'. Natural dyeing techniques, also of longstanding tradition, are used to colour the yarn before weaving. Because the lambda are important funerary ritual cloths, this tradition has

remained largely unchanged. What has changed is the ecological balance of the Malagasy plateau.

Over the years, the original tapia forests have been chopped down and used to produce the charcoal needed for cooking. The slow-growing tapia tree has been replaced by the faster growing white pine and eucalyptus trees. Both of these species are invasive and discourage understory growth. As an added complication, the Borocera larvae rely only on the tapia tree for food. Thus, this change has affected the population of this important Betsileo silk producer.

The Betsileo villagers first noticed a reduction in the understory plants that they relied on for medicinal purposes. They contacted government officials and studies were undertaken that indicated that the root of the problem was the presence of the white pine and eucalyptus trees. A program was begun to re-establish the tapia forests.

Wood is a valued commodity in Madagascar. With no electrical power, wood is the only way to cook food. Therefore, from the beginning of this program, it was essential to establish a common goal, specifically that the tapia saplings be left to grow. They were able to accomplish this by attaching a monetary value to the silk, thus leaving the trees as food for the larvae.

The spinners and weavers of the silk have organized themselves into cooperatives. Men have taken on the role as caregivers of the tapia trees and the Borocera larvae. Together, they have pooled their resources, making this silk fabric available to a wider audience and, in turn, re-establishing the original forests of the central highlands of Madagascar.

This presentation will include pictures that the author took while working in Madagascar, demonstrating all of the steps in silk production used by the Betsileo women. Pictures of the tapia forests and some of the remedial steps being taken in re-establishing the forests will also be included.

Natural Fibres – The Safe Fibre for Children’s Apparel **Muriel Mendes and Ela Dedhia**

Clothing is supposed to provide protection to the wearer. However, in case of clothing for children, this may not hold true. Since the use of synthetic clothing for children’s apparel is definitely hazardous to the child in fire accidents, natural fibres such as cotton are preferred. However, when used for children’s clothing, it is essential that they be treated with a flame resistant finish in order to be safer for children.

The main objective of this paper is to identify the fibre content in children’s apparel that could aggravate burn injuries in case of fire hazards. The methodology involved reviewing the mandatory guidelines or standards which need to be addressed by garment manufacturers producing children’s wear for international markets. The methodology also included reviewing recalls of garments carried out internationally as they failed to meet the federal mandatory standard for flammability under the Flammable Fabrics Act. As part of this study, a survey was conducted of 75 parents of infants / young children in order to examine their fibre preferences for their child’s clothing. The results revealed that parental preference for cotton was 57%, 52% and 93% for their child’s casual wear, party wear and sleepwear respectively as compared to synthetic or blended fibres. Since a

considerable percentage of parents preferred cotton fabrics for their child's apparel, it is essential as per standards laid, that such garments, though possessing excellent comfort and durability properties must be flame resistant. On documenting various safety standards, it was suggested that all children's party wear and nightwear should either be flame resistant or it should contain flammability labels. However, the survey revealed that none of the parents had observed any flammability labels during purchase of children's cotton party wear or nightwear which indicates the ignorance on the part of manufacturers to warn parents on the flammability of the cotton fibres used. Moreover, none of the parents were even aware that children's wear should comply with certain Federal Standards. A survey of 25 children's wear manufacturers and retailers in Mumbai revealed that the cotton garments manufactured by them were never tested for flammability due to the high cost involved in testing.

Since infants/children are totally ignorant to the hazards caused by such unsafe garments, it is the responsibility of the manufacturers / quality controllers to test the flame resistance of cotton apparel and the parent's responsibility to demand safe garments.

Thus, this paper will highlight these unsafe aspects and create an awareness amongst consumers, which is very much needed, about the unsafe elements in the garment and will instil a dire need to protect the little children from untoward incidences.

A New Visual Angle: Interweaving Salvaged Vegetable Materials, Felino, Italy
Antonella De Nisco and Anna Painsi[†]

'A New Visual Angle' is an innovative event whose goals are to bring together textile, artistic, and anthropological elements by inviting young and old people to participate in the process of interweaving branches, trimmings and other salvaged natural materials. This project is part of Antonella De Nisco's ongoing Laboratorio di Arte Ambientale Itinerante (LAAI) – Itinerant Environmental Art Workshop.

The basic idea behind the project series is to actively engage local people – from beyond the world of art – in an experience of a textile workshop through simple practical gestures such as interweaving, which are accessible to everyone, to realize a work of environmental art which carries strong symbolic values, changing with local contexts.

In the public park or “Natura e Vita” of the village of Felino (Parma, Italy) in 2007 a textile artifact was produced as part of a larger project with the title “Abitare i Luoghi” (To Inhabit Places) carried out by the local environmental association, the municipality and the elementary school. This helped to create a visual angle which invited people to bring a new gaze on their landscape. Local people were actively engaged in creating

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interwoven walls through the re-use of different materials salvaged from clearing gardens – such as willow branches, vine shoots, trimmings, branches - obtaining different textures. The “art of doing” interwoven walls allowed the people involved in the workshop to learn how to interweave thus stretching creativity, opening up a new way to see, to peer into, detect, and perceive the landscape. Weaving is teaching through technical gesture but it is also a metaphor of the encounter between people in a place, a park. By creating an artifact as a symbolic gesture on the land, it combines a new way of re-considering the landscape while it interweaves new links and restores old relations among people living in the same community.

Herein lies the meeting point between our competences and creativities. The artist interacts with the place and with the gestures of the people; the textile event which results brings together more than just the skills of single individuals, but also their capacity of relating with each other in the creative gesture of re-creating the same place. As part of the project, the anthropologist engaged with local people in generating a new sensibility about the memories of and their interconnections to the place. The ideas running through the project can be re-conducted to a lively debate stemming from Marc Augé’s concept of Non-Places (1992).

The presentation will be based around a series of slides taken during the realization of the event, which will highlight the innovative features of the project.

Extent of usage of natural Fibre for Basketry Handicraft Products in the Kariakor Market of Nairobi, Kenya

Bosibori Oigo, Mercy Wanduara and Everlyn Nguku (not presented in person)

Handicraft production and sale is a source of income for many people in Kenya. The Kariakor market is popular for basketry handicraft products targeted at tourists visiting Nairobi, Kenya. Many of the handicrafts are made from natural fibres from different sources; however some of them are made from man-made substances. The natural fibres are eco-friendly and biodegradable. The purpose of this research is to document the natural fibres used for basketry and their product range. The study seeks to establish the percentage of handcraft products made from natural fibres, the sources of the fibre material for making them, and how much value addition is done on the handcraft products. The study will also find out which challenges the traders selling basketry handicrafts face and their suggestions on interventions related to processing the natural fibres, quality and production output that would increase demand for the basketry products and income.

Keywords: basketry handicraft, natural fibres

Old Bleach Linen Company: A Case Study from a Curatorial Viewpoint Frances Pritchard

This paper surveys the products of an Ulster linen firm. The Old Bleach Linen Company was established at Randalstown, Co Antrim in 1864 but it did not come to international prominence until the 1930s when it expanded into more stylish furnishing fabrics. It

achieved this partly by commissioning designs from acclaimed freelance designers including Paul Nash, Ronald Grierson, Ashley Havinden and Marion Dorn, and partly by working for high-profile clients particularly leading shipping firms, hotels and members of the royal family.

The company's output when it was in the vanguard of interior fashion design form the fabrics most often represented in public collections. A selection of these will be discussed to reveal the quality, texture and composition of the linen furnishing textiles, which gained such a high reputation in the mid twentieth century.

Fabric, Colour, Shape: Interacting Constraints on Ancient Greek Dress **Liza Cleland**

The vagaries of preservation – loss of textile remains, preservation of sculpture (but not its colour) and the predominance of bichromatic pottery – have led to the co-existence of multiple scholarly perspectives on ancient Greek dress. In the art-historical tradition, focus has been, and remains, on the 'forms' of dress. Archaeology has, outside of the artistic evidence, had to concentrate on the practicalities of production or the more durable accessories of dress, encountering garments themselves mainly through cross-cultural comparisons and inferences about techniques. Cultural and social history is confronted with the clear traces of a complex and multivalent dress culture, but these lack obvious connection with the artistic and archaeological evidence. Constructing any integrated conception from these disparate strands poses daunting challenges; instead the clearest progress often seems to come from maintaining the integrity of each discipline. From such a perspective, the title of this paper is laughably ambitious.

However, one thing we do know about ancient Greek dress is that each of these strands of modern scholarship, and the extant evidence each approaches with its own techniques, concerns what was an integrated field. In analysis, we can separate the representation of clothing, the production of clothing, the expressive faculty of clothing. But in life, clothing was worn, and in its wearing united its facets into a seamless, and constantly changing, whole. In looking at contemporary dress, we have the luxury of placing analysis alongside this reality: for dress in history we do not, and yet we cannot afford to ignore the nature of clothing as a holistic phenomenon. Therefore, in this paper, I want to explore some ways in which it is possible to create an integrated picture of Greek dress. Rather than treating the more usual topic of interactions between fabric and colour (which are well attested in the archaeological record for ancient fabric production techniques, and much deserving of further study in themselves), I will look at what happens when we add the dimension of shape.

Doing so means questioning evidence from various sources and strands of scholarship, and must be experimental rather than definitive. But my hope is to raise interesting and productive questions. There are many issues in Greek dress that do not arise from the separate consideration of artistic factors in garment shape, the cultural study of garment colour, and the archaeology of fabric. However, once raised, such questions can potentially be answered from existing perspectives. With the aim of raising new

questions in mind, this paper will suggest technical constraints on interactions between fabric, colour and shape; consider how these relate to various known garment types through the archaic and classical periods; and engage with ideas about how changing styles in art affect and reflect this intersection, not simply depicting fabric, colour or shape in isolation. The paper will conclude by considering how focusing on such interactions can help illuminate otherwise intractable issues in Greek dress.

Hemp and Linen in Japan – Tradition and Innovation

Mayumi Maeda

In Japanese, the term ‘asa’ (麻), has following two meanings. 1) All the fibres and fabrics made from plant and leaf stalks. 2) Hemp.

When we refer to ‘asa’ in terms of the first meaning, it includes twenty different plant varieties. Flax/linen was not included until the late 19th century, because it had not existed in Japan initially. There were two important plant fibres in Japan traditionally; hemp and ramie. In ancient tax records, hemp was indicated by the term ‘asa’ (麻) and ramie by ‘karamushi’ (苧). Both were sometimes pronounced in a same way ‘o’ or ‘so’ and both materials were also referred to by the same term ‘fu’ or ‘nuno’ (布), which simply means ‘fabric’. Thus, by using the term ‘fu’ or ‘nuno’, it is impossible to identify which material it was made from. Despite the fact that those two plants fibres have different characteristics and cultural aspects, they look similar to each other, hence the ambiguity of the material ‘asa’ (麻).

That situation continued until 1867, the beginning of the reign of Emperor Meiji, whose government attempted to modernise Japan by importing technology and implementing a social system similar to that of Western countries. Under this policy, linen (or flax) was introduced to Japan as a more durable fibre than hemp or ramie - for military purposes. Then the linen industry developed rapidly. Hokkaido became the main production area for the flax crop, simply by switching from hemp production. During World War One, Japan even exported fine linen to UK, because of British linen shortages at the time. Even though the role of the linen in the military has declined recently, in the last decade, linen has grown in popularity as an icon of a ‘sustainable’ lifestyle in Japan, mainly because of its durability and of its natural look.

It is still regarded somewhat ambiguously as an ‘asa’ fabric, which became more complicated since 1948, when a ‘Cannabis Control Law’ was passed, and hemp cultivation was strictly limited to licensees, mainly the Shinto shrines which have traditionally had a unique relationship with hemp. Following this legislation, the Ministry of the Trade and Industry stipulated that only linen and ramie could carry the label ‘asa’ (麻), while imported hemp clothes were allowed to be distributed with a label simply

stating ‘unspecified fibre’. These actions caused confusion with the consumer. In spite of this, linen has gained exclusive popularity. Regarding ‘sustainability’, interests in local products has also increased, and for linen as well. There are suppliers, located in regions which have a long history of producing hemp and ramie using family-operated looms, who switched to linen production in the Meiji era. Today, these small production units play an important role in producing linen textiles made in Japan.

Adventures in Wool Carding

T. Cassidy

This paper addresses the mystique and humour associated with traditional wool carding. The presentation will begin with a simple demonstration of hand carding, rolag production and then hand spinning. Further to this consideration will be given to how the actions of the hand card were accommodated by the traditional roller and clearer mill card and how highly skilled carding engineers can be both heroes and villains often on the same day. The paper will describe the commissioning of a spinning mill at Fox Bay East on the Falkland Islands in the year immediately after the Falklands war. The difficulties faced in getting there, getting the equipment off a boat and building the plant with only the most basic of tools will be highlighted. By way of conclusion, some attention will be given to the technological position of woollen carding and spinning today and in particular the value of traditional techniques such as mule spinning compared to various forms of ring spinning and unconventional “new” technologies.

Transition Period from Traditional Kilims to Contemporary Textile Art in Turkey and the Role of a Group of Artists

Sevim Arslan (not presented in person)

Textured kilims which have been associated traditionally with Anatolia are mainly produced using the tapestry-weaving technique. However, kilims were principally produced for practical functions and their artistic merit was not established until the 1970s.

In 1950s, Zeki Faik İzer from Mimar Sinan University, Fine Arts Academy had started to deal with Jean Lurçat and textiles as an artistic form were dealt with in his lectures. Texturing and painting workshops were associated with department chair Neşet Günel. Özdemir Atlas’s textural work was called ‘Modern Music’, and ‘Three Antique Anatolian Kings’ and ‘Dance of Cyclopes’ were implemented by Zekai Ormancı and Zeki Alpan for a competition of TRT İstanbul Radio in 1969. This event initiated what is known as ‘Texture Painting’.

Ayla Salman won the Tapestry Competition which was organized by the İstanbul Sheraton Hotel, with her sisal creation called “Narlar” in 1974. This piece has dimensions of 8.5 x 3 metres and thus an area of around 24 square metres. She achieved an important step in the definition of modern Texture art with this creation.

Belkıs Balpınar took part in an international exhibition called “Soil and Fiber” which was organized in association with Ankara Painting and Sculpture Museum. In *Texture Painting Adventure*, Belkıs Balpınar is described as the woman pioneer artist of modern carpets because of her modern interpretations of traditional kilims. Her work is modern in outlook but embraces a rich cultural history.

Suhanday Özay holds a pioneering position in fibre arts and texture painting with her national and international artistic activities. Fibre art notions can be seen in her creations. She uses essential texture techniques with new materials and new interpretations.

The Use of Natural Fibres in Laos: Textiles in the Tilleke & Gibbins Collection **Linda McIntosh**

The use of natural fibres in textile production continues today in the Southeast Asian nation of Laos. Members of the officially recognized 68 ethnic groups and numerous subgroups use hand-woven and/or hand-adorned textiles to represent their group identity in this ethnically diverse country. Cotton and indigo cultivation coincides with the planting of the primary crop of rice annually. Highland groups, such as the Hmong, grow hemp to weave into cloth and to twist into rope used in rituals. Many groups gather vines from the forest to create bags. The use of natural fibres exists both in rural and urban areas of the country. This paper focuses on the use of cotton and silk primarily among the Tai-speaking groups living in Laos by examining hand-weavings produced by Tai weavers found in the Tilleke & Gibbins Textile Collection of Bangkok, Thailand.

The Tai subgroups living in Laos primarily belong to the South-western Tai sub-branch of the Tai-Kadai ethno-linguistic family, and they utilize hand-woven fabrics to distinguish their identities. Tai women are responsible for all steps of textile production from the cultivation of cotton and natural dye materials, sericulture, the spinning and reeling of thread, weaving, and sewing. Girls, beginning at the age of six, begin to assist female relatives with different stages of textile production, and traditional society judges a woman’s maturity and potential to be part of the community by these skills. The uniformity of the thread a girl spun is considered a reflection of her patience and attention to detail. Both informal and formal courting rituals focused on the production of cotton thread, and references to reeling silk are found in traditional literature.

This paper first presents a review of the production and use of cotton and silk in Laos, relying on field research conducted over the last ten years. Surveys of textile production have been undertaken in all but two of Laos’ provinces, studying home-based and commercial production. Then, different types of Tai textiles belonging to the Tilleke & Gibbins Textile Collection of Bangkok, Thailand, are examined to demonstrate that cotton and silk compose both everyday and ceremonial textiles. The examples include 100-year-old examples and newer or later productions. Silk is often considered a prestige item and must be reserved for special occasions only. Some Tai groups use silk in household items, such as blankets and door barriers. Silk is worn as daily attire for some Tai women. Cotton thread and cloth play important functions in rituals, often connecting the living with their ancestors. Un-dyed cotton cloth is offered in both animist and

Buddhist rituals so can be considered as prestigious in some situations. This study also demonstrates that the use of natural fibres, mainly cotton and silk, continues in the hand-woven textile production of the Tai peoples of Laos although the availability and use of synthetic fibres is growing.

The Tilleke & Gibbins Textile Collection is a private resource with the mission to preserve the textile heritage of Southeast Asia, with a primary focus on Tai textiles, and is available to the public for education purposes in order to expand the appreciation and knowledge of Southeast Asian hand-woven textiles.

**The Female Form as Inspiration for Contemporary Woollen Knitwear
Jeong Seon Sang, Myung-Ja Park, Brenda Sparkes and Kath Townsend**

Fashion is closely concerned with bodies. The female body has been moulded in various ways by fashion designers over time. However, few people have explored three-dimensional body shapes using fully fashioned knitting techniques. We intended to examine such natural and aesthetically pleasing shapes using this technology and to combine inspiration and innovation to revolutionise contemporary perceptions of clothing. The objectives of the project associated with this were as follows:

1. To explore and analyse the female body as inspiration for new ideas.
2. To ascertain the nature of recent innovation and technology in the current fashion knitwear industry and predict future possibilities.
3. To use the outcomes in a contemporary collection of knitted pieces.

The keywords of this project are human body, beauty, fashion, innovation and technology. To find the relationship between them, research questions such as the following were asked:

1. Is there an ideal beauty and has it been consistent through the ages in different cultures?
2. How has the female body been displayed to fit an historical ideal beauty?
3. How was the female body redefined by fashion designers in the last century?
4. In what way can new technology contribute to fashion knitwear design?

Resulting from this, diverse research resulted including the examination of relevant historical and contemporary art, a review of the history of western fashion culture and contemporary fashion design through visiting museums, galleries and exhibitions. We drew inspiration from the above research for the design of outcomes. Various knitting machine mechanisms and the properties of materials as well were considered. Woollen yarn was found to be the ideal raw material to create natural three-dimensional shapes due to its stretch and bulk properties. Also, it is possible to create a more prominent three-dimensional shape by felting of wool fibre. This paper reports further on this project and shows to what extent the objectives were met.

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**The Symbiotic Relationship between Natural Fibres and Finishing Processes:
Innovative Methods of Designing
Kate Wells**

This paper discusses a small area of my research which involves the creation of textural textiles. I am continually enquiring into historical and traditional patterning techniques in association with fibre properties and colouration methods to bring new life and a fresh meaning to the textile design process: one that embraces textiles fibre content and properties with finishing technology. In this paper I will introduce the work of current researchers, practitioners and designers working in the industry that push the boundaries of conventional textile design by uniting technology and finishing processes with the inherent physical properties of natural fibres, and using this combination as a design tool.

From the dawn of history, finishes, as well as colour and pattern, have been employed to enhance natural materials by imparting particular properties to fabrics and improving their intrinsic qualities. Barber states that knowledge and application of the physical properties of textiles dates back to their origins and the discovery of felt by Asiatic nomads around 7000 BC. Their use and application have developed throughout the centuries through technical innovations. The softness and warmth of a material was of major interest to people in the Middle Ages with woollen fabrics being consolidated by milling techniques and their nap raised with teasels.

Throughout the eighteenth and nineteenth centuries silks were dyed black and at the same time weighted between 30-400 per cent with the application of ferric solutions combined with tannic acid. This was to produce the fashionable 'rustle' associated with black silk at the time. (Hummel 1885. p.180)

The Industrial Revolution brought the advent of calendaring, mercerising and moiré finishes that could be used to provide lustre to silks, wools, linens and cottons, offering interesting effects for the current fashions of the time.

With the onset of the 20th century other printing and finishing processes were invented and developed; employed by designers like Fortuny who invented innovative methods for setting silk to create fine permanent pleats and exploited the processes of devoré. Popularity of these and other finishing processes by designers are integrally linked with the fashion trends at the time.

This situation remains unchanged as devoré and crimp styles of printing have maintained a position in or out of fashion over the last century. (Wells, K, 1998). In the current design climate, many designers look towards these and past techniques to create texture and interest within a textile material to ensure a commercial viability in a rapidly changing industry.

Throughout the centuries the physical properties of natural fibres have had a symbiotic relationship with finishing, colouration and the design process. These processes have influenced the wealth and diversity of textiles we have inherited and over the last 150 years have added to a heritage of innovations and creativity in textile design. This

continues to develop as designers embrace sustainability and the environment within the field of design looking forward to new technology but also to the past for the wealth of knowledge that is awaiting rediscovery.

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Designing the Texture of Light – Lighting Design Using Textiles

Soo Yeon Kang and Myung-Ja Park

Key words: Lighting, wool, textiles, texture of light

Designers usually design lighting as “equipment”, a container for a light source. In order to decorate the container in an aesthetically-pleasing manner, a range of design elements need to be considered, including shape, line, colour and texture. However, the effect of light when the lighting source is turned on is more important than the appearance of the light source (i.e. the container) itself. In other words the most important consideration when designing lighting is the appearance of the light itself rather than its source (i.e. the container). Even though light is formless and intangible, there are various visual elements that are of importance: colour, scale, direction, movement and texture; amongst these, this study focuses on the texture of light.

In order to apply texture, a skin was designed to cover the light source. Various materials were considered, included various woven fabrics, knitted fabrics, laces and felted fabrics. A convergence of this product with various types of textiles is therefore considered and this paper reports on this consideration.

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State of Preservation of Keratin Material Found at Different Archaeological Sites

Gabriele Wortmann and Franz Josef Wortmann

Keratinous materials, such as human or animal hair and feathers, are very stable and resistant to environmental influences. Consequently they are often found together with historical and archaeological human or animal remains. Environmental conditions during preservation, i.e. mummification, induce specific changes of keratin structure and amino acid composition. Humidity, temperature, pH and chemical influences change keratin proteins in different ways and can be explained through the course of the preservation process.

Changes of keratin proteins due to preservation in a glacier differ considerably from changes which outlasted under different climatic conditions (e.g., dry & hot). Results of

microscopic analyses, X-ray diffraction, thermal and protein chemical investigations synergistically elucidate specific facets of the changes of the molecular and morphological structures in keratin fibres and feathers for a number of pertinent cases.

The Effect of Historic Processing Methods on the Stability of Silk Artefacts

Paul Garside and Paul Wyeth

Silk is a culturally important textile, found in many artefacts of historic significance, including clothing, upholstery, banners and decorations. Therefore it is important to understand the behaviour and properties of the material to be able to conserve these objects for future generations. Unfortunately silk is a fragile material and may deteriorate rapidly, a problem which can be exacerbated by some historically common processing methods such as 'weighting' and bleaching.

Weighting was used with many European silks from the Middle Ages onwards. Silk was traditionally sold on the basis of weight, so its value could be fraudulently increased by the use of organic additives such as sugars, waxes, gums and animal glues (particularly after 'degumming' - the removal of sericin from raw silk). Subsequently, weighting became accepted as a means of imparting a particular texture and drape, and by the late 18th century the organic agents had been replaced by metal salts (particularly those of tin, lead and iron) which form insoluble aggregates within the fibres. This remained common practice through to the 20th century. During the same period, 'sulphur stoving' (exposure to the fumes of burning sulphur) was widely used to bleach silk.

European silks of this period are known to frequently degrade much more rapidly than both earlier silk artefacts and contemporaneous silks originating from the East, where these practices were not used. As a result, weighting agents have long been believed to be implicated in the degradation of the material, leading to characteristic 'shattering' (splitting along the lines of the warp and the weft), but the evidence to support this has been largely anecdotal. There is also limited information about the influence of bleaching treatments on the stability of silk.

By using silk samples prepared via historically accurate processing methods followed by artificial ageing, along with a collection of historic silk specimens between 50 and 200 years old, we have been able to demonstrate the way in which both weighting and sulphur bleaching affect the stability of the material. Tin weighting, for example, promotes photo-ageing (representing the damage caused by exposure to light) but has little influence on thermal ageing (representing the range of oxidative and hydrolytic reactions which occur naturally with time), suggesting that objects treated in this manner might adequately be preserved simply by protecting them from direct sources of light; indeed, there are some indications that the presence of tin may help to stabilise the material. Iron weighting, on the other hand, promotes both forms of deterioration, potentially making these objects much more difficult to preserve. Sulphur bleaching also has a dramatic effect on the stability of the material, and this may help to explain why white and cream components of silk artefacts are often in markedly worse condition than neighbouring strongly dyed regions.

Such information will help to more fully understand silk objects and the way in which certain historically common methods of processing affect the natural properties of the material. This will, therefore, inform the interpretation, conservation, display and storage of these important artefacts.

Characterising the Silk Collection at Brodsworth Hall **Naomi Luxford, David Thickett and Paul Wyeth**

There are many ways to view and understand a collection within a historic house, for example, acquisition records, construction details, art histories, the display context and conservation records. However, for a more complete picture of the silk collection and its condition these must be supplemented with the results of scientific analysis.

The English Heritage silk collections are the subject of current research. In particular, an investigation of the critical causes of silk deterioration in historic houses has been undertaken. Five English Heritage properties were selected and the object records searched to identify those containing silk. Subsequently, the properties were surveyed to find the silk materials and ascertain their condition. The conservation and environmental monitoring records were also consulted, to further understand the objects and their display.

The investigation of the collection at Brodsworth Hall offers an illustrative case study. Brodsworth Hall near Doncaster was built in 1860 for Charles Thellusson and furnished by Lapworths around 1863. The receipts from Lapworths provide many details about the collection and its acquisition. However for the majority of the textiles there is no detail beyond a basic description. The silk collection at Brodsworth Hall is extremely fragile and almost all silk objects on display have received some conservation treatment. It was unclear whether the poor condition was a result of processing methods, such as the heavily weighting of silks, or the effects of the display environment. Identifying the presence of weighted silks and understanding the causes of the observed silk condition is not straightforward.

To provide further insight into the collection silk micro-samples were removed and analysed, and a complementary in situ study performed. Analysis of the historic micro-samples via X-ray fluorescence spectroscopy (XRF) allows likely weighting elements, such as tin, to be identified, while chromatographic analysis affords the silk fibroin molecular weight, a marker of condition. In situ analysis with XRF allowed further identification of potential weighting elements from objects which could not be sampled. The use of near infrared spectroscopy to study the condition of silk non-invasively, in situ was also investigated. The results were compared with model samples subjected to accelerated ageing under known environmental regimes, mimicking ageing on open display in historic houses. The outcomes will help elucidate the critical causes of silk deterioration and hence suggest possible mitigation methods.

Day Two

Development of Geotextiles from Jute and Coir Fibres

P. K. Banerjee

Jute cultivation is primarily restricted to India and Bangladesh, accounting for approximately 66 per cent and 25 per cent respectively of the world production (ca. 3 million metric tons). The principal outlet for jute fibres is the packaging sector. However cheaper and lighter synthetic packaging material is steadily eroding this traditional market stronghold for jute fibres.

India and Sri Lanka are the leading producers of coir fibre accounting for 75 per cent and 22 per cent respectively of the world production (ca. 0.5 million metric tons). This high Indian share is in spite of fibre extraction from only 25 per cent of the nuts produced in the country. The rest of the potential fibre source is either used as household fuel or dumped as garbage.

The principal motive behind the development of geotextiles from jute and coir fibres is to generate alternative avenues of utilization for these raw materials. The dimensions and mechanical properties of these two fibres render them eminently suitable for certain classes of geotextiles.

The Pre-seeded Erosion Control Blanket (PsECB) is designed to prevent wind and rainfall erosion along denuded slopes where seeding the surface can be difficult. PsECB is a needle punched fabric, based on intimate blending of jute and coir fibres, in which suitable seeds are trapped during the production process itself. Such a pre-seeded fabric just needs to be spread on a slope and suitably watered for the seeds to germinate and vegetation to take root. The Nonwoven PsECB permits sufficient light to penetrate but prevents wind and rainfall from direct contact with the protected surface.

BRECODRAIN - the Eco-friendly sheath-core Prefabricated Vertical Drain (PVD) – is produced on a suitable tri-axial braiding machine that converts jute yarns directly into a sheath while a large number of thick and parallel coir yarns get encased within this Drain to form the core. This PVD, when pushed vertically into a soft and silty soil, provides in-plane and cross-plane flow paths to the trapped pore water, leading to rapid consolidation of soil.

JAO - the Asphalt Overlay fabric from jute yarns and coir husk – is meant for rehabilitation of old cracked district and rural paved roads. JAO is placed between new overlay and the old cracked pavement for preventing reflective cracking, i.e. an upward flow of crack from the old pavement to the new one, thus enhancing the effective life span of the new pavement.

Limited laboratory-scale trials of the three products developed from jute and coir fibres and yarns, for controlling rain and wind-induced erosion of soil, for consolidation of soft soil and for preventing crack propagation in bituminized pavements, have yielded encouraging results. The production process of all these products is fairly simple and non-polluting. However a fine-tuning through up-scaling and field trials is required for commercialization.

Spinning Wheels for Natural Fibres: Variations on a Theme

Florence Feldman-Wood

The intrinsic characteristics of any natural fibre must necessarily influence the type of spinning wheel used to twist that fibre into thread. Over the centuries and in different regions of the world, spinners have relied on locally-crafted spinning wheels that were best suited for the locally available fibres. Spinning wheels are structurally pulley systems, and while the structures might vary in the size and arrangement of their components, the mechanical principle is the same. This paper will discuss how the spinning wheels designed for spinning cotton, wool, and flax have evolved from simple structures to more complex ones. Examples will show the many variations in the components.

The most important aspect of any natural fibre is its staple length, which determines how much twist is required to make the raw fibre into a strong consistent thread. Cotton fibres have a short staple length and require a tight twist. This was accomplished on small spindle wheels. There are many variations of spindle wheels found in cotton-producing regions of south Asia. These were probably among the first spinning wheels invented. Their structural variations are primarily in the style of drive wheel.

Staple lengths of wool fibres vary by breed from very short and soft to very long and coarse as a result of thousands of years of sheep breeding. Short wool fibres are carded for woollen spinning and also require a tight twist. When spindle wheels reached Europe around the 14th century, they were enlarged, mounted on tables, and used for spinning wool. This structural design for spindle wheels was brought to the Americas by colonists from Europe. Long and lustrous wool fibres, prepared with large metal combs into roving, could be spun on spindle wheels. Some 16th century illustrations also show it being spun on smaller spinning wheels with bobbin/flyer units.

The bobbin/flyer unit was a major improvement on spinning wheels. With the flyer rotating around the bobbin the spinner was able to spin continuously, in contrast to working on a spindle wheel, where she had to pause to wind the thread onto the bobbin or quill. Another major structural development was the 17th-century addition of a treadle, or foot pedal, which freed the spinner to use both hands to manipulate the fibres.

Flax fibres of two- or three-foot lengths, the product of a long and complicated process, required special treatment. Grown in the temperate climates of northern Europe and eastern North America, it generated the greatest variety of spinning-wheel structures. All included a bobbin/flyer unit and most had a treadle. In many styles the bobbin/flyer unit is in horizontal alignment to the drive wheel, in others the unit is in vertical alignment. A distaff to hold the prepared flax might be built into the wheel or be free-standing. Regional woodworking and decorative styles added to the many variations that can be found.

This brief survey can only hint at the vast array of spinning wheels used with natural fibres.

Influence of De-gumming Processes on *Bombyx Mori* Raw Silk
Everlyn Nguku, Mercy Wanduara, Bosibori Oigo (not presented in person)

The fibroin filaments of cocoon silk are naturally gummed together with the protein sericin. Due to the presence of sericin, the raw silk fibre is rigid and stiff. Its removal is imperative and is carried out in order to impart a lustrous and soft effect on the silk. The process of eliminating this sericin or gum is known as degumming. In this study three methods are used: extraction with water, treatment with alkali and digestion with enzyme. Comparison is made on the effects the three processes have on silk yarn in terms of weight loss, elongation and tensile properties.

Key words: *Bombyx mori*, protease, alkali, elongation, tensile properties

Woven Concrete
Patricia Belford and Ruth Morrow

The project associated with this paper is part of an ongoing AHRC project aimed at identifying and developing fabrics which prove durable in the alkaline environment of concrete. The area of the project reported in this paper is aimed at identifying yarns suitable for integration in concrete

The woven concrete project developed out of collaboration between a textile designer and architect seeking to bring together the technologies of concrete and textiles. In the initial stages of the project fabrics used were 'off the shelf' and accidentally suitable for embedding in concrete. This woven concrete work was driven by a desire to develop and design weaves that could become fabrics in their own right, and be bespoke to the users in the embedded environment of concrete. Testing ideas of concrete as textile and textile as structure. Technical restraints driving the outcome. In collaboration with a fellow research assistant specializing in yarn constructions and a weaver, offering each the opportunity to investigate variations in weave structures using a combination of metal and natural fibres, the resultant fabrics being tested by use of erosive and controlled distortion techniques.

The project was divided into 5 stages.

1. Yarn trials – producing samples of combination yarns and systematically testing these for durability in an alkaline environment.
2. Trialling and selection of resultant weaves – Testing stage, involving placing samples into formwork and pouring concrete.
3. Trial Manufacturer of weaves (distorted and eroded)

4. Trialling and selection of resultant distorted and eroded weaves (this is a repetition of stage 2 with samples generated in stage 3).
5. Manufacturer of full size samples.

This paper will chart the development and collaboration of this body of work both from an academic and industrial context, making recognition of its achievements and difficulties. In conclusion the paper will outline the potential for future research in a context of creating 'real' products.

Fibres, Patterns and Polyhedra

B.G. Thomas

For much of the twentieth century, the University of Leeds played a pivotal role in the analysis and interpretation of patterns – the three-dimensional patterns which are the basis of crystal structures and the two-dimensional patterns which are the basis of tessellations. This research tradition can be traced back to the Nobel Prize-winning work of W.H. and W.L. Bragg who, in 1912-1913, laid the foundations of x-ray crystallography as a method for the determination of structures.

In the 1930s, W.T. Astbury of the Department of Textile Industries, building on work initiated by J.B. Speakman, pioneered the use of X-ray diffraction techniques in establishing the relationships between the molecular structure, anatomical form and physical performance of wool fibres. H.J. Woods, a textile physicist working with Astbury in the 1930s, applied this knowledge to present a geometric framework for the design of one and two-dimensional patterns. Conceptually several years ahead of theoretical crystallographic developments worldwide, Woods is recognised for laying the foundation of current thinking in the area of pattern geometry.

The principle underlying this groundbreaking work is the fundamental concept of symmetry. Symmetry is possibly the most significant and elegant connection that transcends the boundaries between art, science and mathematics. One of the most practical applications of symmetry, drawing on concepts originating in the study of molecular crystal structures, is in the analysis and construction of plane patterns. Following certain geometrical rules, an extensive number of pattern solutions unfold from a few basic elements, offering innovative potential in design and the decorative arts.

The Leeds tradition has been maintained and ideas more commonly associated with the nanostructures of polymers continue to stimulate research in the areas of design. Fundamental to this work is the importance of structural geometry as a significant connection that transcends traditional subject boundaries. Recent research has considered aspects of symmetry in two and three dimensions and determined the geometric rules underlying the application of patterns to three-dimensional mathematical solids. This paper will build on this work, exploring the problems associated with the application of the colour counterchange patterns, first enumerated by Woods in 1936, to the surface of polyhedra.

Enduring Threads of Tradition: The Block-Printed Cottons of Rural Rajasthan

Emma I. Ronald

In India, birthplace of cultivated cotton, the manufacture and trade of cloth, alongside agriculture, has formed the mainstay of the regional economy for over 4000 years. Cotton, unlike wool and silk, cannot absorb natural dyes easily and requires a *mordant* or metallic salt to link dye to fibre. Until the discovery of synthetic dyestuffs in the latter part of the nineteenth century, the unsurpassed master dyers of cotton were the craftsmen of India. Using complex and multiple applications of *mordants*, minerals, plant dyes and resists, often taking up to six months to complete, the Indian craftsman monopolised the arcane art of permeating cotton cloth with richly hued, colour-fast designs.

It is no surprise then that cloth in the north Indian state of Rajasthan bears enormous social importance; showing status in society, and caste or tribe affiliations. Pattern, colour, motif, garment style and assemblage all indicate a wealth of information about a wearer's individual and group affiliations, gender, and position in the local social structure. This cloth-conscious social structure, and the way that hand printed cotton textiles are entwined in the lives of local pastoral communities, is largely responsible for the endurance of traditional hand block print and resist-dye techniques in the region.

In this paper I present evidence that the continued existence of this craft also relies heavily on the inherited skills of a small number of hereditary cloth dyeing and printing families of the *Chhipa* community, who continue to produce the lengths of richly patterned cotton in earthy shades of rust reds, indigo blues, jewel-like jades and ochre yellows. Despite the advent of mechanisation and the aggressive industrialisation which followed India's Independence in 1947, these artisan families, based in remote towns, still hand print cloth for local use using recipes and techniques handed down through many generations. Recent decades have witnessed an influx of synthetic fabrics as the new 'easy-care' base-cloth for garments, often replicating the colours and designs of traditional hand printed cottons. Whilst traditional dress codes are retained by older women of the communities, younger generations choose newer ways of expressing their social status and identity.

A wealth of photographic images, gathered during extensive fieldwork in Rajasthan, trace the cotton cloth from its loom-state, through the lengthy and complex dyeing processes, to the finished textiles, seen in cultural context. These visual materials offer a unique insight into the hitherto largely ignored complex language of cloth in rural Rajasthan, in a paper which highlights that focussing on everyday things such as cloth can be a rewarding way to understand the changing complexity of social life. The difficulties with which cotton fibres are permeated with colour, but the permanence of their results, is thus perhaps a reflection of the way in which these textiles have become a strong and permanent thread within the local fabric of Rajasthani culture.

Value Addition of Khadi Spun Silk by Hand Block Printing Using Natural Dyes

Anjali Karolia, Jaya Nagrani and Hemlata Raval

'Khadi' meaning a hand-spun and hand-woven natural fibre fabric, came into being around 1857 during the initial stages of India's struggle for independence and was considered a symbol of patriotism as it helped in avoiding foreign goods entering the market. Khadi weaving gives employment opportunities in rural areas of India even today and approximately 9 million people are employed in the production of such natural fibre fabrics. Printing and dyeing these fabrics with natural colours would add value to them and could be used in the ready made apparel industry. The desire to create garments and other artefacts that reflect the beauty of the world around us and provide for the expression of our artistic nature has been evident since time immemorial. The realization that certain colourless materials could be used as mordants to fix some plant dyes was a vital step in the prehistory of dyeing and printing. The age old art of dyeing with natural dyes was common in India and the potential for creating variety of shades with the help of natural and metallic mordants was discovered in very early times.

Hand block printing (also still practised in rural India) and the use of natural dyes is achievable under basic processing and working conditions and can be practiced with ease by rural people in their homes and can assist with economic development at both the micro and macro levels. This study therefore deals with the concept of hand block printing and dyeing with selected combinations of mordants and pH using the natural dyes - turmeric and Indian madder for the value addition of khadi staple silk fabric which over the decades has moved from a freedom fighter's identity fabric to be employed as a fashion garment.

The investigations associated with this paper included the development of a colour palette from two natural dyes, namely Indian madder and turmeric by variations in pre-treatments (with and without myrobalan), pH (alkaline, neutral and acidic), and mordants at different concentrations (alum, copper sulphate and potassium dichromate). For the value addition of khadi silk fabric an exploratory approach was formulated wherein the Persian motifs categorized under three categories i.e. floral, geometric and calligraphic were hand block printed onto khadi spun silk fabric using the researched colour palette. Kurtis (Indian version of a tunic) for young women were constructed from these printed fabrics. These kurtis were then exhibited and responses pertaining to awareness of natural dyed products, colour combinations, overall aesthetic appeal, acceptability, marketability and economic value were gathered from the consumers of Vadodara city.

The results revealed that the colours produced by natural dyes were interesting and attractive due to the tone and tone effect they showcased. The colours produced by turmeric were brighter compared to those by Indian madder dye. The concept of printing and dyeing of khadi silk fabric with the combination of Persian motifs and natural dyes for value addition was very much appreciated and thought to be a novel and unique idea. A variety of shades can be produced for today's competitive market by varying the treatment, mordants and their concentrations, using combinations of mordants,

combinations of dyes and by dyeing at varying pH conditions. The application of natural dyes is easy and recommended for the Khadi industry as the new direction of this industry should be towards product diversification and value addition. With the innate desire of a designer to create a fresh look, the investigator made an effort to step out of the old and to produce a product which fitted with modern technology and at the same time recognised tradition and the force of contemporary fashion. Parallel with this is the possibility to revitalize traditional concepts which have been in decline since the onset of urbanisation.

**Creation of a Database of Animal Fibre Proteins for the Identification
of Ancient Textiles
Caroline Solazzo**

The potential of using hair proteins for the identification of animal fibers from textiles and furs has become evident a few years ago with the advances in the field of proteomics (Hollemeier et al., 2002). First used for detecting frauds in the importation of fur (Hollemeier et al., 2007), the methodology has been recently applied by the same authors to the identification of ancient tissues (Hollemeier et al., 2008).

The correct identification of animal fibres is important for the detection of rare fibres and blend of fibres in ancient textiles, as well as for the modern adulteration of luxury fibres such as Cashmere with sheep wool in the textile industry (Kerkhoff et al., 2009). When archaeological textiles are degraded, during their life history or by the burial or environmental conditions, traditional methods of identification (by microscopy for example) are of limited use.

Proteomics attempts both qualitative and quantitative comparisons of the protein composition, and can detect and identify species and mixture of species at a low level of detection. A database has been started which relies on grouping all known hair proteins of wool-producing animals, namely the low-sulphur α -keratins or Intermediate Filament Proteins (IFPs) and the KeRaTin-Associated Proteins (KRTAP or KAPs). The database contains, so far, IFPs and KAPs of dog, cow, horse, sheep and goat, obtained from available genomic data, as well as an important number of manually-sequenced peptides. A quicker way to identify different species is to compare protein profiles (Peptide Mass Fingerprinting) of protein digests of hairs. My library of PMFs contains most current species (yak, camel, alpaca, vicuna, guanaco, Mohair and Cashmere goats, Angora rabbit, sheep, dog and cow).

As an application of the identification of textiles by proteomics I will present one of my recent studies on the Salish blankets from the Northwest Pacific Coast of North America. Ethnological and historical accounts have reported the use of dog hair in the weaving of blankets by the Salish people, but only one scientific study has attempted at demonstrating the actual presence of dog (Schulting, 1994). Trypsic digests of 25 samples from 11 blankets from the Smithsonian Institution and identification by using the Keratin database and comparison with reference materials from the same period, have

finally brought a final conclusion to the controversy of the presence of dog hair in the famous Salish textiles (unpublished results).

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A Study of the Nature and Deterioration of Iron-Tannate Dyed Natural Fibre-Based Textiles

Helen Wilson, Vincent Daniels, Marei Hacke and Chris Carr

Natural fibres have been dyed black using iron-tannate dyes for hundreds if not thousands of years. The dyes were used on most continents to colour objects for aesthetic, domestic or ceremonial use. Iron-tannate dyed objects are part of our world heritage and are present in museum collections worldwide. However, these objects generally deteriorate with age at an accelerated rate due to the iron-tannate dye. The localised dye induced degradation results in rapid embrittlement and fibre loss, hence presenting a threat to the integrity of the overall artefact.

A collaborative AHRC/EPSRC funded PhD project has been initiated between the University of Manchester and The British Museum, which aims to develop treatments which will inhibit this accelerated damage. In order to characterise and understand the nature of the degradative pathways modern woven natural fabrics have been dyed and artificially aged to simulate the degradation seen in similar materials in museum collections. However as part of the initial studies a range of historic dyeing methods from various locations and historic periods were critically analysed for rationale and reagents. The identified variables of temperature, reagent concentrations and ratios, one-stage or two-stage methods, order of treatments in two-stage methods, submersion times and repeat dyeing were examined on cotton, abaca, silk and wool. Clear differences in the colouration efficiency and visual appearance/ spectral profiles between cellulosic and proteinaceous materials were observed. Following these fundamental dye characterisation

studies novel protective treatments will be developed and applied to the model substrates and their potential effectiveness for conservation established.

Utilisation of Hyacinth Fibre for Handicraft Products in Nairobi, Kenya
Mercy Wanduara, Bosibori Oigo and Everlyn Nguku (not presented in person)

The water hyacinth (*Eichhornia crassipes*) is a free-floating perennial aquatic plant whose hazardous effects have affected water masses including dams, rivers and lakes in Kenya. In an effort to eradicate the weed (hyacinth) some Kenyans are using its fibres for economic gain making products for use in homes and offices. This paper reports on a study which seeks to establish the extent to which the hyacinth fibre is being used for consumer products in Kenya. An explanation is given of the processes which hyacinth undergoes to make the desired products from (harvesting) uprooting to the point of sale. An examination is made of the various products, the current and potential market place and the identity of current and potential consumers of these products. The study was carried out at three locations where the hyacinth products are sold namely Ngong Road, Westlands and Githurai.

Keywords: water hyacinth, handicraft

Sustainable Living and the Craft of Home-made Rug Making in the 21st Century
Penny Godfrey

Before the Second World War, rug making at home used mostly recycled materials, cast-off clothing or mill ends of fabrics or yarns, sometimes over dyed. For the foundation of the product, rug makers typically used recycled sacking or bought hessian cloth. When the rugs wore out, they were moved through progressively less prestigious rooms to end up on the compost heap, where, because they were natural fibres they rotted away, releasing nutrients for vegetable growing.

Simple rug making tools were mostly home or locally made of wood or metals, sometimes adapted from other worn out tools, and were likely to be handed down from generation to generation.

The need to recycle is now once again becoming imperative as we all seek to “Reduce, Reuse and Recycle” in order to live more sustainably.

The West Riding Ruggers have just celebrated their 21st year of rug making with an exhibition at the Bradford Industrial Museum called “A Rough Guide to Rag Rugs”.

By examining rugs in this exhibition, this paper seeks to establish whether rug making at home still follows these traditions, and whether home crafted rug making is still contributing to sustainable living.

**A Reappraisal of the Socio-cultural Significance of North Country Rag Rugs with
Particular Reference to the Use of the Colour Red.**

Karen E. Griffiths

“Why does the mat have a red diamond in the centre? Why, it’s to stop the devil coming down the chimney of course” (Elderly rag rug maker)

In their most typical form rag rugs were made entirely from natural fibres – the base usually a hessian sack made from jute while the ‘pile’ was made from hoarded scraps of cotton and wool cloth. These scraps were cut and then laboriously ‘prodded’ or hooked through the base to make the rug. They are strongly associated with working class communities, both rural and urban, in the north of England although evidence for the practice of making them can be found throughout the UK.

Although few surviving rag rugs can be accurately dated the assumption among the few who have researched the subject is that the origins of rag rugs lie in communities of Viking descent in western Scotland and Cumbria (Tennant 1992 p51). Others such as Steedman (1998 p273) more realistically suggest that the earliest rag rugs coincide with the rise in availability of factory-made textiles during the first half of the 19th century across the wool areas of the Pennines. Hessian sacks were readily available from grocers’ shops by the 1840s.

Very little has been written about the history and socio-cultural significance of these textiles in Britain. Various reasons may be given for this, among them the low esteem such poverty crafts were held in by the Victorian middle classes.

This paper aims to show that the value of the textiles used and the time taken to recycle them into rugs has been underestimated and that furthermore the use of red fabrics within traditional designs has an apotropaic significance that has been ignored. The perceived worthlessness of the rags and worn clothing that went into a rag rug will be challenged using evidence for the flourishing 19th century second hand clothing and paper making industries (Lemire 1998). It will be suggested that the investment of both money and importantly time in the making of these rugs was a result of a deep-seated folk tradition of using worn textiles and amuletic colours to protect the thresholds and hearths of houses against the evil eye.

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Flax in Medieval Novgorod.

Heidi M. Sherman

This paper reports on the study of medieval north-western Russia's flax production, focusing in particular on the region's largest town, Novgorod, which was a significantly large state in the 14th and 15th centuries. The evidence for flax production and processing is especially rich and this paper makes an examination of some of this evidence, spanning the period from the 13th to the 16th centuries.

Posters

Creative Cotton Lampshades through Seamless Knitting

Wonseok Choi, Myung-Ja Park and Kyu Hye Lee

Key words: Seamless, Knit, 3D, Lampshade

Research Objective

“The astonishing new technology in contemporary textiles is narrowing the gap between the worlds of art, design, engineering and science” (Braddock & O’Mahony 1998). It is significant to develop new products to efficiently combine advancing technologies through creative exploration to maintain competitiveness in the global textile and apparel industry. This research explores and develops creative lampshade patterns and structures created by computerized seamless-knitting machines. Computerized seamless (complete-garment) knitting is a next generation technology which has the capability of making three-dimensional tubular fabrics without any seams by the use of a range of technical features containing individual needle selection capabilities (Abounaim et al. 2009).

The development of lampshades in commercial and residential markets has been done conventionally by cut-and-sew methods. The use of modern electronic seamless-knitting technology in a new development process for the lampshades offers numerous potential benefits such as better trim appearance by eliminating seam lines, quick-response production, mass customization, consistent product quality, and numerous other advantages. The seamless knitting technology is also capable of creating specialized knit structures within the seamless lampshades at the same time. In addition, advanced knitting methods such as shaped-tubular knitting, multi-tubular knitting and other methods enhance design and functional aspects of the products.

Developing unique designs for the production of lampshades is effective in improving characteristics of the products with respect to aesthetics, function, value and durability.

1) Aesthetics

Computerized seamless (complete-garment) knitting technology is capable of creating a tubular-shaped knit fabric or garment as well as a variety of complex knitted structures within the tubular fabric or garment (Choi 2006). Within the fabric or garment, varied geometric shapes and line movements can be created. The geometric shapes and line movements on the knitted lampshades can be emphasised effectively in the light.

2) Function

It is desirable where possible to employ specialised properties of yarns, such as ultra-violet (UV) colour changing characteristics, which allow more sophisticated colour effects. Also, a two-dimensional fabric with 3-D knit-structures can be utilized in a lampshade. Lampshades created by modern electronic-knitting machines, moreover, have the capability of effectively expressing exciting design silhouettes since the knitted fabrics tend to have elasticity and flexibility which facilitate a deformability of the fabrics (Gommers, Verpoest & Van Houtte 1998).

3) Value

There is no seam line on the tubular knitted lampshades which provides a better trim appearance. Tubes can additionally be shaped and multiplied. Sizes, colours and structures can be varied.

4) Durability

Fabrics used in home furnishings such as lampshades must have durability. Also, fabrics utilised in lampshades are required to be heat- and fire-resistant. In addition, environmentally-friendly fibres would be appropriate for home furnishing fabrics. Hence, cellulosic fibres including cotton, linen and Tencel® or protein fibres, including wool treated by a flame-retardant finish, can be considered suited to create the seamless lampshades.

5) Techniques

Technically, a number of knit structures are examined such as tubular knitting, rib and purl (links-links) structures, loop transference, Jacquard and other structures. This research explores various knitted-tubular constructions, design and functional possibilities by assorted seamless knitting techniques and applications of numerous types of yarn that include cotton, wool, Tencel®, et cetera. This study also examines innovative ways to design and customize lampshades through seamless knitting.

6) Market

The seamless lampshade products allow mass customization. The unique products can also be applied to niche marketing. The products are expected to satisfy the contemporary market which requires quick response and just-in-time production. Suggestions for retail merchandising and marketing of such unique products are examined. Therefore, the objective of this research is to analyze and explore the possibilities of production of creative lampshades through the computerized seamless knitting technology.

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Eco-friendly Aspects of Issey Miyake's Fashions

Mee Jekal , Jung Im Jang, Wonseok Choi and Youn Hee Lee

Keywords: Issey Miyake, naturalism, eco-friendly fashion

The purpose of this study is to analyze eco-friendly characteristics of Issey Miyake's fashions and thus to develop an understanding of how this is incorporated into his fashion design. As more and more people recognise environmental problems, keeping to the message of environmental protection is of importance worldwide. Artists, designers and producers work together to produce eco-friendly fabrics of the highest design quality by combining traditional techniques with innovative tools and methods. Issey Miyake is a renowned fashion designer with a focus on eco-friendly design.

A variety of literature and various online sites for eco-friendly trends in Issey Miyake's fashion work were referred to. Eco-friendly fashions were selected from the period 1980 to 2008 and were analysed with respect to their eco-friendly characteristics. The results of the study are reported below.

An eco-friendly trend in clothing usually expresses itself through concern for the environment and the use of natural materials. Issey Miyake's fashions are typical of this eco-friendly trend. Firstly, he expresses the feeling of abundant surface texture using coarse and irregular fabrics and the use of raw silk, typical of the Japanese tradition (Kim & Bae 2003). In addition, he uses further traditional material such as simple cotton, hemp, tender silk and, further to this, unique materials from everyday life such as paper, bamboo, wire and whalebones. Secondly, the main colours used in his fashions were beige, brown associating naturals and also dark colours such as black and blue. Third, a variety of natural objects was associated with his fashions. Forth, he expressed simple minimalism in the cutting out process by applying traditional Japanese traditional cloth-kimono techniques, excluding dart or princess line. He has thus modernised traditional Japanese pattern cutting. Resultant geometrical forms give a feeling of simplicity and comfort on the structure of the human body (Kwon, 2007).

The eco-friendly characteristics of Issey Miyake's design are experimental and based on tradition and naturalism. It results from his firm fashion philosophy that fashion should be natural and sympathetic to the human body.

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Towards Sustainable Consumption of Knitwear: Antecedents of Dissatisfaction with Product Sustainability

Yeon Hee Kim, Jiyeon Kim and Kyu Hye Lee

Key words: Criteria for evaluating knitwear, dissatisfaction with product sustainability, knitwear interest.

Over several decades, there has been rapid development in research assessing product sustainability. More and more consumers are concerned about sustainability, yet not many studies have been aimed at the understanding of incidences of dissatisfaction with product sustainability. Modern knitwear production is obviously prone to changing fashion and garment trends. Modern production enables comfortable fitness and practicality as well as diverse coordination, and it occupies an important place in the fashion market. Demand for knitwear has increased recently, but one of the main characteristics (or disappointments) of knitwear consumption is that often products do not address consumer expectations associated with shape retention and fitness for purpose (or function) as understood at the time of purchase. At the point of purchase, various factors and individual criteria act on judgment, and then consumers' experiences show a discrepancy after the knitwear item has been purchased and used.

Hong et al. (2002) reported that women in their twenties and thirties were satisfied with criteria for evaluating knitwear such as design, colour, comfortableness product fit and quality. But they were dissatisfied with post-purchase product attributes for knitwear such as napping, transformation after washing, and required product care. An endeavour to find relationships between point of purchase evaluation criteria and post purchase satisfaction can give a better understanding of consumer behaviour. Consumers who have high interest in clothing keep up with fashion information and also examine various criteria carefully at the purchase point (Chae et al. 2006). Clothing interest (knitwear interest in the present study) is expected to have an influence on product evaluation and overall post-purchase satisfaction.

Methods

A survey questionnaire was developed for the empirical study. Criteria for evaluating knitwear and dissatisfaction with product sustainability were modified from Eckman et al.'s prior research (1990), and those for evaluating knitwear interest were adopted from Lee and Park's study (2006). All statements were measured on a five-point Likert-type scale. Item measuring criteria for evaluating knitwear was factor analyzed. Three factors explaining 68.1% of the total variance were extracted and they were symbolic, intrinsic, and price criteria. Reliability of the criteria for evaluating knitwear was in the range of .66-.79. Reliability of dissatisfaction with product sustainability was .81.

Data from 489 questionnaires were used for the statistical analysis. 44.4% of respondents were male and the average age of the respondents was 37.2. For statistical analysis, factor analysis, reliability, descriptive statistics, and hierarchical regression were employed using SPSS 12.0.

Results and Discussion

The influence of the criteria for evaluating knitwear on dissatisfaction was identified by hierarchical regression analysis. In the first step, the linear model include intrinsic, symbolic, and price criteria. In the second step, knitwear interest was added as a dependent variable on to first model in order to analyze the effect of knitwear interest.

Intrinsic criteria ($\beta=.12$, $p<.05$) had significantly positive influence on dissatisfaction, with product sustainability and symbolic criteria ($\beta=-.09$, $p<.05$) had a negative influence. As consumers considered criteria for evaluating knitwear, including needlework and product fit, they were likely to be dissatisfied with the product. On the other hand as they consider the symbolic criteria of advertising and brand, they were likely to be dissatisfied with the product. However, no significant influence of price criteria on dissatisfaction with product sustainability was detected. In other words, at the point of purchase of knitwear, consumers perceived more important intrinsic criteria than extrinsic criteria of knitwear products.

When knitwear interest was included in the regression model, it had a significant influence on dissatisfaction with product sustainability ($\beta=.11$, $p<.05$). In this case, the effect of symbolic criteria ($\beta=-.10$, $p<.05$) increased and the effect of intrinsic criteria became insignificant. When knitwear interest is controlled, the importance of intrinsic criteria at the time of purchase did not have significant influence on dissatisfaction with product sustainability.

This study focused on criteria for evaluating knitwear and dissatisfaction with product sustainability. The role of knitwear interest in the process was also investigated. At the point of purchase, criteria for evaluating knitwear were identified to have an influence on dissatisfaction. In particular intrinsic criteria and symbolic criteria had a positive or negative influence on dissatisfaction with product sustainability, but the effect of price criteria was not significant. When the effect of knitwear interest was controlled, the influence of intrinsic criteria became insignificant. Further research on the relationship between various criteria and detailed dissatisfaction will be helpful to fully understand the knitwear customer.

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Shopping Orientation and Online Information Sources of Young Clothing Shoppers Jungeun Lee, Jiyeon Kim, Ji Young Moon and Kyu-Hye Lee

Key words: Shopping orientation, online information sources.

Consumers receive a great deal of intended or unintended online information when shopping for products online. The explosion of Internet technology has enabled a great number of people to quickly and easily obtain massive amounts of information from all over the world. E-tailers also provide a great deal of information when advertising their online stores and products. It is in the hope that their information will draw attention from e-shoppers. Thus, the online retailers need to understand the reasons why consumers choose online shopping as a means to purchase products. Since e-commerce became increasingly competitive, there is an increased need for e-tailers to understand and utilize the variety of different ways to attract consumers to their products.

Prior studies on shopping generally included the following types of shopping behaviour: hedonistic shopping, which is focused on pleasure through shopping; economic shopping which is the basic force affecting the consumer's ability to shop; convenience shopping, which is intended to save the time and energy of the consumer; informational shopping, which may include advertising, accessible consumer reviews and word-of-mouth (WOM). The information source is one of the most important factors by which e-shoppers choose e-tailers and their online products. In the market place, consumers are able to check out the products physically by touching them or, of importance in the case of clothing, trying the garment on to ensure fit and acceptance of other attributes. On the other hand, with online stores consumers can buy products without physically being at the store. They rely on multiple information sources and can browse more information than in retail stores. Noble et al. (2006) reported that shopping orientations were related to the choice of the media such as social interaction, browsing and comparison sites. This result indicated that this different shopping orientation allows e-shoppers to change their purchase behaviour as well as choosing which medium. The purpose of this study was to segment young consumers into several groups and to investigate the information usage of each group.

Methods

Empirical research was conducted through a questionnaire given to young consumers who are the most likely potential consumers to use online stores. Items about shopping orientation were based on the research of Bae et al. (2007). The questionnaire included a 12 items scale, and the response format of each question item was a 5-point Likert type scale. Out of 200 surveys distributed, 187 usable surveys were analyzed. It was found that 65.2% of the total sample was male. Also, 81.8% of respondents were between 20 to 25 years old. The data were analysed by factor analysis, cluster analysis, descriptive statistics and ANOVA using SPSS 13.0.

Results and Discussion

To examine the sub-dimension of the shopping orientation, a factor analysis was conducted. Five factors were extracted that accounted for 58.16 percent of the total

variance: fashion seeking, hedonistic shopping, brand loyalty, price consciousness, and convenience seeking. Based on these dimensions, K-means cluster analysis was conducted. Consumers were segmented into four groups: brand-loyal group, high-shopping-interest group, low-shopping-interest group, and price-conscious group.

To investigate the tendency of using information sources, a descriptive analysis was conducted. The simple descriptive statistics revealed that for the information concerning the online e-tailers, young consumers tend to use offline word-of-mouth and web-search engines. The banner ads and the e-mail promotions were the least used for online store information by consumers. On the other hand, for information concerning the product, they tend to use online word-of-mouth and e-tailer information followed by offline word-of-mouth and offline retailer. This showed that consumers used more online than offline information sources when they obtained information about fashion products online.

ANOVA results indicated that there was a significant difference in one of the market driven information sources, e-mail, was found across groups. The high-shopping-interest group used e-mail information significantly more. Uses of price-comparison websites were significantly different. The price-conscious group used price-comparison sites significantly more. Mostly, the use of personal word-of-mouth information was not significant across groups. It is suggested that future studies include the effects of contextual variables such as e-tailer types or product categories.

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Surrealist Design Based on the Contemporary Eco-friendly Trend

Kyurey Park, Wonseok Choi and Youn Hee Lee

Key words: Surrealism, naturalism, eco-friendly, harmony.

The purpose of this study is to consider surrealism in the context of the contemporary trend in fashion towards eco-friendliness. The social context of surrealism, as expressed during the 1930s, particularly its revolutionary view of existing society, is compared to modern desires and views, especially those influenced by “global panic” (Eun, Lee & Park, 2007).

In contemporary times eco-friendliness is sympathetic to nature and vitality (Kim & Kim, 2006). This study aims to express surrealism and contemporary naturalism via the three approaches. First, flowers used as motifs which express association with an ideal beauty and have an illusion relating to landscapes, meadows, warm seasons and the beauty of nature. Second the use of soft silk which, when used in fabric form, draped over the human body, suggests the sensuous curves of the human body. Third the use of hemp in knitted-fabric form suggesting a contrasting, rustic, coarse to touch, but natural texture in contrast with the silk.

The result of the study is as follows. Surrealism is in collusion with contemporary naturalism. Flowers used for this study show a world of illusion based on surrealism and mystery; at the same time they represent an assimilation to nature.

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Korean Consumers' Brand Behaviour in Apparel Shopping: Interaction Effects of Age and Gender

Semi Song and Yeon Hee Kim

Key words: Korean consumer, brand behaviour

Because of the developments in technology, it is getting increasingly difficult to make functional differentiation between various products. Often consumer behaviour and purchasing decisions are based on product attributes associated with particular brands (Simmons and Lynch 2001). Brands are indeed recognized as an important determinant of consumer shopping behaviour. When products' standards are vague, preference for brands makes consumers feel that they are able to differentiate effectively. In the Korean context, due to market, the globalisation, sales of famous international brands are increasing sharply and the competition faced by national brands is severe and accelerating (Park 2008). In addition, consumers have lead changes in purchasing apparel; for example many online apparel market users have appeared (Na & Suh 2008). Such changes affected consumer shopping behaviour of the national brands. The research seeks to identify the nature of Korean consumers' brand behaviour for apparel products as well as general products. The interaction effect of age and gender is investigated.

Methods

For the empirical study, a survey questionnaire was designed. This was composed by six questions. For brand behaviour relating to apparel shopping, important issues included: "the search for a national brand fit and style," "the purchase of famous apparel brands" and "online shopping." For the brand behaviour relating to general products, important issues were: "a preference global brands," "a preference for familiar brands," and "a preference for famous brand". All the questions were measured by five-point Likert type scales. The data from a representative sample (in terms of gender and age) of 250 consumers were analysed statistically. SPSS 12.0 was used for the statistical analysis. t-test, ANOVA(one-way Analysis of Variance), and MANOVA (Multivariate Analysis of Variance) were conducted.

One hundred and twenty-five males and one hundred and twenty-five females participated. Age ranged from 20s (33.3%), 30s (16.6%), 40s (16.6%), to 50s (16.6%). They were undergraduate students (21.2%), office workers (21.2%), housewives (12.8%) and business people (10.8%).

Results and Discussion

To figure out a difference between apparel/general products shopping behaviour and age/gender, we estimate a multivariate analysis of variance (MANOVA) with two independent variables (gender and age) and two dependent variables (apparel/general products shopping behaviour). There were significant effects of gender on purchasing in the context of famous apparel brands, and online shopping in apparel brands shopping behaviour. Female consumers tended to prefer these two interactions. Female consumers also tended to purchase well-known brands and do online shopping often for super-trendy goods.

There were significant effects of age on online shopping and preference for global brands. Consumers in their 20s and 30s tended to prefer online shopping for apparel or accessories. Consumers in their 20s tended to prefer global branded apparel the most. Consumers in their 50s showed the lowest level of preference for global brands. Young consumers keep up with global trends as the globalisation in the world-wide market is growing more and more.

There was an interaction effect of gender and age on online shopping. The mean response classified by compounding these factors indicated that female consumers in their 20s showed the highest level, followed by 30s female consumers and 30s male consumers. That is, female consumers in their 20s and 30s often purchased their clothes or accessories by online shopping. Also, 20s male consumers showed lower levels of online shopping for apparel, but then 30s male consumers were involved in online shopping for apparel to a certain amount. Meanwhile female consumers' apparel brands shopping behaviour indicated the importance of fashion information. For the brand behaviour toward general products, there were no significant effects of gender and age.

This research was a basic approach on Korean consumers' brand purchasing behaviour for apparel products and general products taking into account the effects of age and gender. The results emphasised the significance of online shopping and the importance of digital technology and networks in the context of the internet generation. Future research on brand behaviour should include not only gender and age, but also more diverse apparel shopping related variables (such as education level, occupation, social class background living location etc).

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Self-esteem and Clothing Shopping Confidence: The Mediating Role of Product to Self Perception

Song-Yi Youn, Ji Youg Moon and Kyu-Hye Lee

Key words: Self-esteem, shopping confidence, self perception, body image.

Individuals want others to see the images that they want to express. In this process, clothing plays an important role. Consumer behaviour related to clothing may be different depending on levels of self respect and the degree of proximity of the clothing product to the individual. Body image consists of subjective descriptions based on physical appearance, and usually reflects self-esteem of the individual and values of the associated society. This study focuses on shopping confidence as one of the outcome variables of such self-related factors. The purpose of this study is to investigate the influence of self esteem on shopping confidence in the purchase of clothing products. The roles of psychological variables relating to clothing and body image, proximity of clothes to self and body satisfaction were included in the study.

Conceptual Background

Self-esteem as an evaluation method relating to individuals' self concepts means how much he or she considers himself/herself as a capable, important, and valuable being (Coopersmith 1967). A person with high self-esteem is likely to be more confident of their own taste, the first to purchase new styles and, above all, influence other consumers to adopt and buy new fashion items (Beaudoin, Moor & Goldsmith 1998).

Shopping confidence has been studied as a one of the sub factors in shopping orientation and persons with high self-esteem showed shopping confidence in clothing behaviour (Fairhurst 1985). Self-esteem has been found to be positively related to attractiveness in a way which indicates body image and satisfaction (Lennon & Rudd 1994). Body image as a term which refers to perception of physical self is not only fundamentally essential concept but also an assessable component to explain consumer behaviour. Body image and the level of satisfaction to the body usually reflect self-esteem of the individual and values of the society (Cash & Brown 1989). Body satisfaction has a strong relation also to self-esteem and clothing behaviour. Body image and its satisfaction to the individual have a mediating role between self and clothes to self. The purpose of this study is to investigate the direct and indirect effect of the self-esteem on clothes to self and body image/body satisfaction. The final goal of this research is to define the relationship between self-esteem and shopping confidence, considering clothes to self as a mediating variable.

Method

A survey questionnaire was developed for the empirical study. Data from 127 respondents were analyzed. Results indicated that the conceptual model was a good fit to the data. 49.2% of the respondents were female and 42.2% were male. Ages ranged from 18 to 32 years. Structural equation modelling was used together with the conceptual model with self-esteem as exogenous variables, shopping confidence as an endogenous

variable and body image/clothes to self/body satisfaction as mediation variables. The significance of structural paths was examined using AMOS 7.0.

Results

Results indicated that the conceptual model was a good fit to the data (Chi-square=72.52, df=46, GFI=.91, NFI=.90, CFI=.96). Adequate range for all factors was detected in the factor loadings of the measurement model. Given structural paths, several significant/insignificant estimates were illustrated. Self esteem significantly influenced consumers' perception on proximity of clothing product to self ($\gamma=.31$, $t=3.24$). Self esteem positively influence body satisfaction ($\gamma=.80$, $t=5.18$) but did not have significant influence on body image construct ($\gamma=.30$, $t=1.58$). Body image had significant influence on clothes to self ($\beta=.19$, $t=3.97$), and body satisfaction had insignificant influence on clothes to self ($\beta=-.09$, $t=-1.44$). Shopping confidence was positively influenced by proximity of clothes to self ($\gamma=.86$, $t=3.43$). Body image ($\gamma=.16$, $t=1.7$) and body satisfaction ($\gamma=-.05$, $t=-.51$) did not have significant direct influence on shopping confidence. Analysis of modification indices indicated that there was no significant direct influence of self esteem on shopping confidence.

Conclusion

This study was founded on the recognition of the importance of the relationship between self-esteem and clothing to self and investigated other clothing related variables' role as mediators to affect shopping confidence. Clothes to self played a significant direct role in forming self-esteem and shopping confidence. Also body image has an effect on clothes to self. Since direct influence of self esteem on shopping confidence was not found, it may be thought that people who are self respectful are self confident in clothing shopping. However, it should be noted that the perception on clothing product to self plays a significant role in the process. The importance of the clothes to self in clothing shopping behaviour was acknowledged in the study. Additional roles of body image and body satisfaction in the process have to be further investigated in future studies.

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Knitwear Design Through the Application of Kim Whanki's Abstract Paintings **Hae Woon Choi, Yoon Mee Lee and Myung-Ja Park**

The designs of many fashion designers world wide are often inspired by making reference to the outputs of visual artists, particularly painters. Korea's famous artist, Whanki Kim, belongs to the 1st generation of Korean modern abstract painters. In 1963, Kim moved to New York where he established his own peculiar artistic realm related to 'Pointillism' and based on Korean lyrical sentiment. In this project, attempts are made to find effective ways of materialising inspiration from Kim's paintings into knitwear. At the initiation stage, the purposes of the project were as follows: to analyse the colours and shapes of dots in Kim's paintings, and to establish the various ways in which these may be expressed in knitwear, thus finding effective techniques for materialising Kim's Pointillism into knitwear.

In his 1960-1970s abstract paintings, Kim used various shades of blue and several high saturation colours. These were cerulean blue, ultramarine, Prussian blue, Holland blue, French blue, violet, red, green and yellow. In line with the current trend in fashion knitwear, dots were materialised and expressed by using various knitting techniques. First, dots were realised by techniques such as skashi and missing stitches. Second, forms such as pompoms and other motifs were expressed by means of crochet. Third, dot patterns were created by the various materials and colours. Fourth, certain objects such as beads, plastic chips, spangles and felting were employed/added. Fifth, burn-out finishing was used in order to emphasize dot patterns and see-through effects.

The fibrous raw-material employed in this project was wool/acrylic yarn. Coloured wool top was used in needle felting. A one-piece dress and long coat were knitted using a domestic knitting machine. Needle felting techniques were used to express violet, red, yellow, green dots and wet felting method was used to shrink waist size of one-piece dress. Two coloured dot patterned knitwear represented Kim's work of monochrome by placing countless dots on the whole canvas. Felting coloured dots in different locations by using the needle felt technique made my work more diverse. By using wool/acrylic yarn and wool top, this allowed visual aspects of Kim's abstract paintings to be represented.

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Analysis of Knitted Fabrics in Fashion Trend Books (2002-2007) **Seung-Young Jung, Hae Woon Choi and Myung-Ja Park**

The objective of this research is to identify characteristics (such as fibre type, estimated yarn count, twist, stitches, colour etc.) of knotted fabrics featured in trend magazines and, based on this, to identify dominant features and properties.

Method

Knitted fabrics were selected by year and season from fashion trend books for six years from 2002 to 2007, and analysed accordingly. Sources used included Nelly Rodi Knitwear 2002 S/S-2005 F/W, Nelly Rodi Fabrics 2006 S/S-2007 F/W, and Promostyl Fabrics 2002 S/S-2007 F/W. A total of 827 pieces of knitted fabrics were selected and analysed. [S/S = Spring/Summer and F/W = Fall/Winter]

Results

The themes associated with the fabrics selected were as follows: 'Natural', 'Modern', 'Romantic', 'Active', 'Mannish', 'Classic', 'Ethnic', and 'Feminine'.

It was observed that blended fibres were used more than unblended fibres in all seasons, and generally, the usage was three times higher in F/W and two times higher in S/S. The reasons why blended fibres were used more are associated with the fact that they improve the value of products by complementing advantages and disadvantages of each fibre, and also blends satisfy consumers' needs for various fabrics. The composition of fibres were in the order of synthetic fibre (44.1%), cotton fibre (22.5%), regenerated fibre (21.7%), flax fibre (5.8%) in S/S, and synthetic fibre (47.6%), wool fibre (29.7%), regenerated fibre (13.5%), cotton fibre (5.2%) in F/W. In the examination of the types of yarns for each year, the ratio of regular yarn vs. fancy yarn was 6:4. In S/S, the frequency of fancy yarn usage was the highest in 2003, and the frequency was the lowest in 2006. The fancy yarn usage in F/W was the highest in 2002, decreased greatly in 2003 and increased in 2004. In short, the frequencies were greatly varied. Like the composition of regular yarn and fancy yarn, the composition of single and twisted yarns showed that the average ratio is almost similar in S/S and F/W for six years, but in 2006 and 2007, single yarns were used frequently. In F/W in 2002, when twisted yarn was in dominant use, the value of the average thickness was high too. Filament yarn showed higher frequency than spun yarn in S/S.

The dominant knitting structure stitches used were Plain, Colour Jacquard, Rib, Miss, Lace, Tuck, and Raschel regardless of year. Plain structure, which was used most frequently in S/S, appeared at 27.8% on average for six years. Its distribution was higher in the late 2000s than in the early 2000s. It was the same in F/W. The percentage of Plain for F/W over the six years was 45.1%, which is a higher percentage when compared with the percentage for S/S. Patterns were used more in S/S. Similarly, Jacquard with various patterns appeared frequently in S/S (17.4%), and Rib with excellent elasticity showed high frequency in all seasons. For patterns in knitted fabrics, there appeared knits with

most patterns in all seasons in 2002. In S/S, stripe patterns (40.5%) showed higher frequency than solid pattern (31.0%), and the frequency was in the order of abstract pattern (11.1%), geometric pattern (5.8%), and check pattern (5.1%). In F/W, the frequency of solid patterns (39.2%) was the highest, and the next in the order of dominance were stripe patterns (31.9%), abstract patterns (8.9%), geometric patterns (6.6%), and check patterns (6.3%). Stripe patterns were the most used pattern in knitted fabrics.

Finishing of knitted fabrics was considered also and divided into physical-chemical treatment and decorative finishing. On the whole, such finishing was used in around 20% cases to give gloss effects to surfaces. The techniques used primarily were metallic decoration, embroidery, and quilting.

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