

Creating the future by learning from the past: a way to find new fashion materials

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Abstract

Many fashionable styles that appeared in the past can currently be recognised as ‘extreme fashion’. Changes in fashion take place for many reasons: for example, constant interest in new styles and new designs, cultural and material intercourse between countries, changes in social and political situations, industrial development and the creation of new materials. This paper focuses on the influence materials have on ‘extreme fashion.’ Some materials, such as nylon and polyester, were invented for the purpose of creating new fibres. New materials introduced into the fashion industry, however, have quite often been developed and used in other fields. ‘Artificial silk’, for example, might not have been invented in the late 19th century had it not been for the research and development for its use in explosives, plastics and filaments for incandescent lamps. Also, the fashionable crinoline style in the middle 19th century might not have been so widespread if industrial steel-making had not been possible in the 1850s. A more recent example is the light emitting diode (LED), invented in 1962, commonly used in the electronics industry ever since, but until recently unrecognised as an interesting fashion component. In addition, learning and studying history as well as culture may also help the development of new creations. The growing interest in recent years in health and natural materials in Japan has led to the successful marketing of fashion items using fibres made from corn, bamboo and milk protein. These materials were originally developed in the 20th century, during the Second World War, due to the shortage of conventionally used materials, but have been all but forgotten in recent decades. Finding ‘extreme materials’ would be one way to aid the creation of new designs and new fashion. In order to achieve this, it will be important to further the exchange of knowledge among researchers and creators, and to promote interest in different fields internationally.

Keywords:
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Introduction

Looking back at the history of fashion, many styles, once considered fashionable, might be described as extreme, ridiculous and impractical today. At the court of both Louis XV and Louis XVI in the 18th century for example, ladies' gowns were spread on both sides of the hips by special panniers. As the gown was so large, the wearer could not get thorough a door unless she walked sideways. The gown's heavy silk, of good quality, and with beautiful motifs indicated the wearers' authority and wealth. Despite public criticism and satire, the enormous skirt, supported by a birdcage-like crinoline, once again became fashionable in the middle of the 19th century. During this period, such dresses in brilliant colours were in fashion, not only for high society, but also for the working class. Changes in fashion happen for many reasons: constant interest in new styles and design, cultural and material intercourse between countries, changes in social and political situations, industrial development and creations of new materials.

This paper focuses on the influences that materials have had on the creation of 'extreme fashion.' Even for fashion designers today it is fundamental to find the right material in order to translate their concept into reality. Sometimes they must even collaborate with fabric manufacturers, even those outside the fashion industry, in order to develop appropriate materials. Innovative styles, which may become new fashion, can only be made possible when new materials or processes are developed or old materials or processes are rediscovered. How can new materials be developed or for that matter, even conceived? Many commercially produced materials have usually existed long before they were available on the open market, their development, sometimes, being a result of a strong demand from the market and/or from industry. They are however, quite often found in other fields and not known in the fashion industry until someone recognizes their usefulness. This phenomenon is similar to cultural intercourse, which may have a huge impact on both cultures. For example, *Japonisme* in Europe: art; the *kimono*; *ogi* (Japanese paper fan), and European influences on the Japanese: the business suit; dresses; shoes; and hats in the latter half of the 19th century. In some cases, materials may even have been forgotten in the field for which they were developed. On the other hand, some materials and techniques which are used traditionally and are well known, may be transformed into advanced products or

manufacturing processes simply by adding unique twists. Studying historical costumes and traditional textiles from all over the world will not only stimulate our creative minds, but will also increase our chances of rediscovering materials, techniques and traditional methods lost in history. Bunka Gakuen Costume Museum has been collecting historical and traditional costumes from Japan, Europe and other countries for almost thirty years. Together with Bunka Women's University Library, and the Bunka Fashion Resource Centre, whose collection includes modern designer's clothes, a huge study collection of former student creations, as well as traditional and contemporary materials from fabric companies, Bunka Gakuen offers to students, graduates (many of whom are now working in the fashion industry), specialists (such as designers and artists), and the general public the opportunity to enjoy and study fashion and textiles from all over the world.

Synthetic dye and steel

In the middle of the 19th century, the so-called 'crinoline' style was in fashion. The fabric in the 18th century 'rococo' style dress was generally much heavier figured silk than that of the 'crinoline' style dress. The amount of fabric needed to make a crinoline dress may be calculated as at least ten meters (Nouzawa 1991). It was therefore, only possible for women to wear and walk in such a large skirt if the fabric was light, replacing previously worn layers of stiff petticoats, and a strong, light weight steel 'crinoline' was employed (Plate 1, overleaf). Since steel was an expensive material at the time, its use, to make crinolines was not possible before Henry Bessemer was awarded a patent for the 'Bessemer process' in 1855, which allowed for industrial-based, mass production of inexpensive steel. If it were not for the industrial revolution, the use of the 'crinoline' might not have been so extensive, and it may not have become so popular with people in all social classes.

Another characteristic of dresses after the middle of the 19th century is brilliant, strong colours (Plates 2 and 3 overleaf). This was made possible because many synthetic dyes were introduced after the development of the first aniline mauve dye, named 'Mauveine', by Sir William Perkin in 1856. At the time Perkin was an assistant to August Wilhelm von Hofmann, who was investigating ways of synthesising an expensive natural product, quinine, which was in high demand for the treatment of malaria. It was very expensive to dye in mauve with



Plate 1. Crinoline with steel wire c.1860s © Bunka Gakuen Costume Museum

natural products, therefore historically, mauve cloth was only worn by members of the upper-class in most countries. ‘Mauveine’ is created from coal-tar, a by-product obtained through the distillation of coal to produce coke, an essential energy source for the steam engine, and for iron smelting during the industrial revolution. Today coal-tar is recognized as an important raw material in the manufacture of many chemical products, but until the middle of 19th century, this black, sticky, smelly liquid was considered a problematic, industrial waste. Mauve fabric, now able to be produced cheaply, became hugely popular, and many other synthetic dyes followed after 1862, when Queen Victoria opened the International Exhibition wearing a Mauveine-dyed silk dress (Matsuzawa 1993).

Man-made polymer

People have always admired natural materials, and many scientists have tried to imitate or re-create them. Most people believe that ‘rayon’ was the first man-made fibre, widely used since the 1920s, but in actual fact ‘artificial silk’, invented in the late 19th century, is considered to be the first man-made fibre. A Frenchman, Count Hilaire Chardonnet was awarded a patent for ‘Chardonnay Silk’ in 1884. He was assisting Louis Pasteur, a French microbiologist and chemist, who, at the time, was investigating silkworm diseases, which were causing extensive damage to the textile industry. In 1889, Chardonnet exhibited a fabric woven in ‘Chardonnay Silk’ at the Great Exhibition in Paris, and subsequently this fabric was commercially produced. Scientists continued their research into man-made fibres which led to new ways to create rayon¹, such as the ‘viscose process’, the ‘cuprammonium process’, and the

‘acetate process².’ For this reason, Chardonnet is known as ‘the father of rayon.’



Plate 2. Crinoline style dress c.1860
© Bunka Gakuen Costume Museum



Plate 3. Ladies wearing dresses in brilliant colour 1864 ‘Album de la mode illustree’ © Bunka Women’s University Library

Even though Chardonnet’s work was very important and he received a great deal of acclaim, we should consider the preceding development of nitrocellulose, the fundamental ingredient in ‘Chardonnay Silk.’ Artificial silk is regenerated cellulose fibre, derived from natural cellulose, of which the main sources are cotton and wood. In 1846, Christian Friedrich Schönbein, a German-Swiss chemist, accidentally discovered nitrocellulose when he was researching ozone. He promoted this product as an explosive, known as guncotton. Nitrocellulose was also used by Eastman Kodak in 1889 as the first flexible, photographic film base, and its use for motion picture film lasted until 1951. In other fields, Thomas Edison and Sir Joseph Swan were looking for a filament for use in light bulbs. Swan managed to spin fibre from nitrocellulose dissolved in acetic acid. Although Swan exhibited this artificial silk at the London Exhibition in 1883, it was never produced on an industrial scale. Nitrocellulose is also used as thermoplastic, widely known as ‘Celluloid.’ It was originally used as a substitute for more expensive natural materials, such as ivory and tortoiseshell. Gradually, it became recognized for its unique multi-purpose abilities, and enjoyed as a ‘man-made’ material.

The idea however, of making man-made fibre originated much earlier. In 1664, Robert Hooke, an English physicist, suggested in his book 'Micrographia' the possibility of spinning artificial filaments (Hatch 1993). Unfortunately, more than 200 years, as well as devotion, research and experiments, by a host of scientists and chemists in many fields, were needed to make his idea a reality!

Polymer science, which includes synthetic fibres, flourished in the 20th century and as a result many important fibres were developed. When these new fibres appeared on the market, textiles made from them soon became popular, and can be said to have helped in the creation of new fashion. The first truly synthetic fibre available commercially was 'nylon', introduced to the market in 1939³ by the DuPont Company, and promoted with the slogan, "fashioned into filaments as strong as steel, as fine as a spiders web" (Meikle 1995). Nylon has been widely used for dress fabric and stockings. In addition, with its durable property, nylon also found usage in the production of military products, such as parachutes, hammocks, clothing, shoelaces, cords and ropes. Another essential new product, still used extensively today, is 'polyester', introduced in 1951. Over the last 50 years, the properties of polyester and other synthetic fibres have improved, and many different fabrics have been produced. Synthetic fibres are no longer considered copies of natural materials, like silk and cotton, but are highly valued for their versatility and uniqueness.

The 'New Look', designed after World War II in 1947, by Dior, fulfilled the demands of the consumer to once again create an elegant women's image, which had been abandoned during the war. In the decade that followed, people seemed to be freed from old traditions, and started truly exploring and enjoying new fashion with new materials. Development in space science and the subsequent successful space missions fascinated the public, and also influenced a host of designers, including Pierre Cardin, Paco Rabbanne, Mary Quant and André Courrèges, to create futuristic-looking costumes. Their creations were only made possible with the latest in special materials. Cardin used specially produced 'Cardine' for his 'Space' collection, which featured unique dresses with cut-away shapes of roundels and squares. Rabbanne was one of the true pioneers, creating dresses using materials such as metal and plastic, which were generally not considered suitable for making dresses. In 1968, he even made a dress

by joining together small plates of aluminum, a material which industry had only managed to produce relatively inexpensively in the previous decade. Courrèges and Mary Quant also actively introduced new materials and technology into their creations. The raincoat designed by Quant in c.1967 was coated with 'Neoprene' (polychloroprene), the first synthetic rubber to be developed commercially (Eastop and Tímár-Balázsy 1998). Another example is a jacket and jumpsuit set shown in Plate 4. The black leather-like fabric, probably a polyurethane coated fabric, at the collar, pocket flaps and belt gives a dramatic accent to the off-white base fabric. Polyurethane was invented in 1937 by Bayer (Quye and Williamson 1999), and on the market for quite sometime, however the method to create a thin film for coating fabric was a very new technology at that time.

The inexpensive paper dress became fashionable, among young people, in the later half of 1960s. Although they were described as 'paper', some were actually made from non-woven fabric, a material developed in 1960s (Plate 5). The use of non-woven fabric for outer garments did not last long, but continues to be widely used today as interlining and interfacing fabrics, as well as for such uses as disposable surgical gloves, gowns and disposable diapers.

Since the invention of man-made fibre in the late 19th century, many contemporary 'extreme' textiles have been created. The speed of which these new textiles find their way into the fashion industry is accelerating, and changes in fashion have also become more drastic and complex. In this day and age, it should be possible for the more determined creators to find the material necessary to articulate their concept. This however, will only be possible if they maintain a high interest in the development of technology, work closely together with industry, and continue to explore for suitable materials used in a wide variety of different fields.

The latest technology and polymer science allow for the creation of new fibres, many of which have special abilities that natural fibres do not have. In apan during the last 10 years many fabric items 'made from milk, Soya bean, bamboo or maize' have been developed. The successful marketing of these products could be attributed to their outstanding properties to retain moisture, and for their sterilizing effects, however the main reason may simply be an increased awareness of 'eco' life, and renewed interest in health. In the case of maize fibre, its biodegradable



Plate 4. A jacket and jumpsuit set, probably utilizing a polyurethane coated fabric by Courrèges 1969
© Bunka Gakuen Costume Museum



Plate 5. 'Paper' dress c.1968
© Bunka Gakuen Costume Museum

property appeals to the ecological consideration of the consumer, and that consideration is generally transferred to the company that manufactured the product in the form of consumer loyalty. Usually, the consumer believes that fibers made from natural materials are better than those derived from petroleum, even if they have been re-generated. The packaging of such products often carry phrases like “good for your skin” or “better life for nature”, and an image of a nature scene or its original natural ingredients. Investigation into animal and vegetable proteins and cellulose, with the exception of cellulose from cotton, with the purpose of creating artificial fibre dates back to the beginning of the 20th century. However, serious research was only undertaken as a result of increasing pressure, by manufacturers and politicians, to find a substitute for wool, which was in short supply during the Second World War. To ease the effects of the shortage, regenerated protein fibres made from milk, such as Aralac and Lanital, and fibre made from peanuts, Ardil, were produced commercially and extensively marketed (Brooks 2006). Not all experimental fibres have been successful however. In Japan, protein from fish, and collagen fibre from whale blubber and shark were investigated (JFIHPM 1958) and used experimentally during the war. However, most of them were all but forgotten after the war, when there was no longer a shortage of wool. It could be said therefore, that one of the fundamental necessities for successful marketing of new materials, is a long lasting demand.

Recent techniques, fabrics and the LED

Traditional techniques such as ‘Shibori’ (tie-dyeing) and pleating can create very fashionable new looks. When transferring traditional materials into modern fashion creation, it is essential to up-date techniques in order to meet current requirements. Examples of these requirements would be cost effectiveness and decreasing labour intensity, as well as having innovative designs and unique ideas. Issey Miyake’s collection ‘Pleats Please’ first shown in 1993, is one example of the successful use of pleating. Using polyester jersey, pleats are permanent, the fabric is washable, dries quickly, is crease free and light weight. These clothes therefore found many practical uses from daily wear, to travel clothes, and to formal attire for both men and women. These qualities and the introduction of other technologies, such as laser and ultrasound cutting techniques, used to omit over-locking the edges, has meant that this line is still highly popular today around the world (Braddock Clarke and O’Mahony 2005).

Nuno Corporation, a Japanese company in Tokyo, has been producing and providing unique textiles, combining traditional techniques with the latest in technology, since 1984. Nuno’s ‘Origami’ series incorporates the traditional Japanese paper folding technique called *origami*, with pleated fabric. Using polyester, a thermoplastic fabric, they created unusually sharp, crisp, folds, unique shapes and beautiful three dimensional effects. The Nuno Corporation has also been effectively using other traditional Japanese techniques, such as *shibori*, *sashiko* (quilting), and a contrasting weaving method, used to control shrinkage rates, in the manufacture of garments.

Adapting technology, developed in other fields, to the fashion industry can also be another way to create new materials. Another one of Nuno Corporation’s original fabrics is used in the ‘Stainless’ series, designed by Reiko Sudo. Woven polyester was specially coated with stainless steel using a spattering method, which was developed by Masayuki Suzuki for the Suzutora company. This technique was originally used in the automobile industry for coating door handles and other car parts (Braddock Clarke and O’Mahony 2005). Many shiny metallic fabrics, similar to their ‘Stainless’ series, were available on the market soon afterwards and are still available today.

An independent exhibition by Erina Kashihara, an accomplished Japanese artist and jewelry designer, was held at the Pola Museum

Annex, Tokyo in October 2006. She has been successfully creating 'fashion art' using light for about 20 years. She used lights with timer controls to create a blinking effect. After finding Light Emitting Diodes (LEDs) in Akihabara, a world famous electronics mecca in Tokyo, while searching for new materials for her art work about 20 years ago, her work "has evolved into pieces that reflect interaction with the wearers, making the testimony of human life visible as an artwork on the body. Later, as detection sensors reacting to pulse, voice and movements were developed, (her) approach to incorporating these into (her) work has continued. The lights of (her) works have increased possess a variety of new and different looks." (Kashihara 2006).

The LED was invented in 1962, and became commercially available in the 1970s. At that time the LEDs available on the market were almost all red, and commonly being used as indicator lights for electronic equipment, such as radios, televisions and telephones, replacing incandescent lamps. Kashihara remarkably came across LEDs when they were just becoming relatively inexpensive, but still not yet recognised for their use in fashion. The LED, currently found in costume accessories for special occasions, is not yet used for daily wear, but may be found in everyday clothes in the very near future.

Conclusion

During the last 150 years, man has invented many semi-synthetic and synthetic polymers, and developed processes to create new materials. The resulting new products have almost always excited and influenced both creators and consumers, and have played a large part in the setting of fashion trends. These creations were seen as 'extreme' then, and in most cases are still considered 'extreme' today. Useful fibres have often found their initial step into the fashion industry quite by accident, or as a consequence of other fields of research or study, such as medical science or space exploration. Finding new uses for by-products, discontinued or abandoned materials, or no longer used methods or processes, has in the past and could easily in the future allow for the development of new and 'extreme' materials. These materials could be both fashionable and/or practical throughout life, they could create or meet public demand, while at the same time projecting the ideal image of the designer. Investigation, research and development are ongoing in all fields worldwide. It is therefore

important, in order to move forward, to exchange information with specialists in all other fields both domestically and internationally.

Another way of creating innovative work could also be achieved through the study of historical findings. It seems quite logical to assume that breakthroughs in many areas, including materials and processes, lay hidden in those findings. Understanding traditional materials, weaving and dyeing techniques, and decorating methods used around the world, may also inspire innovative ideas and lead to new creations. Museums containing historical and ethnographical costumes, as well as textile collections, offer the public, industry and students the opportunity to study design, costume construction, changes in fashion, and textile and fibre science.

Museums need to maintain rich resources and continue to gather information in order to support students, the general public, specialists and researchers. For example, at the Bunka Gakuen Costume Museum, located in Tokyo, there are approximately 20,000 objects, which are made available for public viewing during special exhibitions held four times a year. In addition, this museum maintains two database systems, one available via the internet, detailing information on over 2,000 of their objects, and the other available at the museum, detailing information on an additional 6,000 objects. (currently available in Japanese only). Curators help people by interpreting objects, and conservators, on the other hand, assist in their activities by treating and rescuing objects. During this treatment, conservators essentially gather information directly from the object or use scientific instruments to do so. Conservators are quite often the only people who handle or have complete access to the objects. Communication, not only in the field of fashion, but also in the fields of museum and conservation science, has been one of the important issues discussed over the last twenty years. People working in museums, such as curators, conservators, educators and administrators, have been encouraged to work more closely and exchange information, as well as to enrich public services, such as improving display and facilities, offering guided tours, database research systems, lectures and symposiums. Museums are places that can genuinely help future generations by providing the opportunity to study and learn about fashion, textiles and technology from authentic three-dimensional objects.

New design and fashion in the 21st century will most likely be created with 'extreme' materials. The hints of these unique materials can be found through historical objects, traditional techniques and materials, and studying technological developments within the textile industry. It is also fundamental to maintain interest in the latest technology, not only in the fashion industry, but also in many other fields, such as polymers, medical science, electronics, and the automobile and space industries. One way to achieve this end would be the domestic and international exchange of information and knowledge among specialists in all fields, such as designers, creators, curators, scholars, researchers, manufacturers, as well as the general public and students.

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Endnotes

1. Rayon means "rays of light" and was named in 1926 by the National Retail Dry Goods Association(America).
2. The fibre made from an acetate process, previously known as 'rayon' is today generally known as 'acetate', and not included as a type of rayon fibre.
3. Dupont Heritage. <http://heritage.dupont.com>

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