



The detrimental effects that fashion, as a model, has upon the world and how biomimetics can alleviate the given issues.

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Over the course of this paper, I will evidence how organisations and brands participate in falsely influencing the consumer that they are an ethical and sustainable company and the negative impact that has upon society and the ecosystem. I break down the definition of fashion and evidence the disadvantages that fashion as a movement has upon the environment. Furthermore, I aim to find how fashion has been around for centuries and question whether it is required within society. How fashion helps groups as well as individuals identify themselves and how this is respected. Different cultural insights on fashion will be collected and deeply insighted. I will debate and discover whether the ever-changing cycle of fashion will ever be able to be stopped. I aim to discover and offer information on how and why fashion as a model must be slowed if it cannot be ended and found to be too valuable to history and society. I will investigate how the correlation between choice and demand with consumers contributes to the fashion cycle. I shall evidence how the lifetime of products and garments is unacceptably short to date and how an enhanced lifetime is beneficial. I will explore whether technology advancements in fashion are a negative or positive feature. The influence of nature within all ranges of design including architecture, material, structures, and product throughout different stages of history will be presented and prove how biomimicry and biomimetics have and can continue to resolve irreversibly damaging environmental and social issues in relation to the fashion model. I will investigate examples of biomimetic designs which have proven to be more successful than previous versions of the same designs. I will explore theorists such as Alexander McQueen to help guide this question to a conclusion. To successfully answer this question, I will use a wide range of research covering current UK Government regulations, an insight into fast fashion organisations including Primark and .

This dissertation will consist of two chapters with my first chapter emphasising how fashion plays a huge role within society and has done throughout history and whether as humans we ultimately need this movement. However, I will also research how the movement has become lost due to the irreversible damage we create on the world as a sacrifice. Moving onto the second chapter, I will explore how biomimetics has been used across history and currently and the beneficial environmental impact it has as well as functional and aesthetic. Lastly, I will provide examples of biomimetics that solve issues which fast fashion creates.

Fashion defines as ‘a style that is popular at the time’ (McIntosh, 2013). The words in this definition ‘popular at the time’ highlight how the fashion movement can be detrimental to society as individuals partaking in fashion can never maintain one style as it changes continuously as time does. This suggests a harmful model to society, but it is the fast movement of individuals having a desire for the everchanging styles and current trends, which creates a continuous cycle resulting with irreversible sacrifices to our world. This is known as fast fashion.



Fig 1 (Bolton,2011)

The shells had outlived their usefulness on the beach, so we put them to another use on a dress. Then Erin O'Conner came out and trashed the dress, so their usefulness was over once again. Kind of like fashion, really.

(Bolton, 2011, pp146).

McQueen's razor clam shell dress referenced above is a metaphor for the fashion movement. The piece was inspired and removed from nature, then whilst after being exhibited on a model, ultimately destroyed. It had one use; to impress others. The shells split and severed like splinters from the model whilst being exhibited explaining how fashion represents clothes often exhibited once and then destroyed. All clothes are slowly destroyed as being worn in, some faster than others. However, the mindset of single use products and clothing as people feel they are not being able to repeat clothing, is killing our world. McQueen believed in and wanted his consumers to take on the mentality of buying well-made and lasting pieces as he quotes 'I try and modify fashion like a scientist by offering what is relevant to today and what will continue to be so tomorrow' (Bolton, 2011, p. 44).

Despite the negative environmental impact fashion has on the world, there are some key advantages to the model of fashion that have been around for centuries proving it is here to stay. The concept of fashion is irresistible to humans as we have a natural urge to both want and need to identify ourselves as individuals. There is a requirement for it within society as uniforms allow groups, such as the public services, to easily identify themselves to the public. The UK police uniform is easily identified across the island and can be lifesaving in instances of emergency. The identification and uniform have been kept safe and protected by the law as 'impersonating a police officer is an offence in England under section 90 of the Police Act 1966' (Duell, 2018) which highlights the recognised importance of the uniform.

Moreover, there is a requirement for fashion to stay within society as some patterns or colours are seen to communicate character, a style, persona, mood, stories and more. People need the movement to express themselves as a person and what they represent. The Kente garment carries a language through its patterns and symbols through its colours. Some of the colours from a Kente cloth represent 'Gold = status/serenity, Blue = pure spirit/harmony and Green = renewal' (Padilioni, 2017). These colour representations are very alike ours in the UK as green represents most logos and models involving recycling a similar concept as renewal. Shown below is the cloth titled 'The King Has Boarded the Ship'. Each way the

cloth is woven and shown translates to certain words which create the story which names the cloth. The translation, cited below, of the Kente cloth, illustrated below, confirms how much information can be held within a pattern and enables us to realise how much information can be then held and translated within whole outfits and why they require to be changed as an individual grows both mentally and physically. Changes in views can implement a change in style as individuals want to express themselves in a different way and allow others to view a different story on their clothing.

The warp pattern, consisting of two multicolour stripes on blue, relates to the proverb “*Fie buo yE buna,*” meaning the head of the family has a difficult task. The weft patterns vary throughout the cloth; these examples are “*NkyEmfrE,*” a broken pot, and “*Kwadum Asa,*” an empty gunpowder keg. (Micots, 2021).



Fig 3 (Dr Miscots, 1995)

Furthermore, another item of clothing which has held important representations throughout history is the Scottish kilt. ‘The kilt is a symbol of honour for the clan which they belong’ (Scotland, 2021). Dating to before 1792, the garment was not only highly functional for its fit for purpose of war but also represents the human that was wearing the kilt feeling of belonging. It was not only the Scottish which respected their kilt clothing as British individuals from outside of Scotland were made to join the British army if desiring to wear the kilt.

The quality of a garment can separate classes within society from another. Although I do not feel this is necessary in society, it has been evident for centuries and therefore plays a role.

This is present as current rich individuals opt for designer wear often representing a brand people distinguish with expense and the people with less immediate expense opting for cheaper garments from fast fashion brands. This separation between the classes in society has been around among all cultures. The Kente cloth is found among the Asante people of Ghana, West Africa. It was originally 'reserved for Asante royalty and limited to special social and sacred functions' (Micots, 2021). Even with the advancements of production, it has allowed the carefully woven cloth to become more accessible but 'continues to be associated with wealth, high social status, and cultural sophistication' (Micots, 2021). This proves that a well identified piece of clothing can continue its identification for lengthy time as the Kente cloth is thought to be developed 'sometime in the 17th century' (Muscato, 2020).

The way that garments are processed or built, in correlation to what they represent, can differ with different cultures across the world stressing the importance again of how important one material can be to multiple cultures. Examples of this have been demonstrated throughout history such as tapestries present in different cultures such as ancient Egyptians, Roman, Greek and Japan all representing different meanings with one theme in common: identity. Additionally, patterns within materials used can create many different representations not just revolving money and wealth. Some cultures reference a particular style and size of a pattern with stories involving historic events, achievements, age, and social stance. The same kente cloth, previously mentioned, is also worn by Ewe people also but in very different ways. It is not excluded from those who are not a part of royalty but instead used to create patterns 'symbolising West African identity and pride' (Miscot, 2021) and the size of the cloth determines the ages of the individual.

Social changes and technology enhancements have meant that printed versions and mass produced of kente cloth are marketed globally. The Kente cloth has been transformed from its original sheet of cloth, sized depending on factors of the individual who will be wearing it. As society has shifted, the cloth can be seen on dresses, shirts, shoes and bags worldwide both printed and woven. A bag containing Kente cloth (Vintage, 1990) is illustrated below. This movement of both technology and society indicates that the sacred and high-quality garments can now be printed and plastered over cheaper materials for mass production.



Fig 2 (Vintage, 1990).

Subsequently, the cloth is losing its longevity through an alternative of toxic dye on poorer materials from original sturdy clothing. The meaning and uniqueness of the pattern is also being lost through over production and we can see the process of this fashion style speeding up. Nature was the inspiration and influence of the original production method of the Kente cloth's biggest influence as it is said to be originated from two brothers who watched a spider weave its web as they were able mimicked the process. A spider is known for being an arachnoid and the organism which represents creativity. The webs they create are pieces of art. The structures they can formulate and create acts as their home, catches their prey and feeds them, and holds their offspring whilst fitting into corners and crooks of areas often at 90-degree angles. I have already discovered the outcome of inspiration from their web structure and process but as their web is so strong, it begs the question what the creative possibilities would be if the materials such as this was used in clothing and at hand to be used in design.

A method to slow the fast fashion movement would be to enhance the longevity of the clothing. Products or garments with a short life cycle are going to the landfill more quickly as the quality worsens and therefore putting a stress on more production of new garments. Both consequences damage the world intensely. Single use plastics have become an increasingly

major issue since they were introduced in products. The four poster advertisements (Smith, 2010, pp. 59), expresses how beach litter can be shown to be seemingly very similar to packaged seafood. After analysing the posters, an additional subject they all had in common was that the litter was all from single or very few used products. This indicates the problem of single use products and products with a short life cycle as the posters were published to the world.

Trends are originated and created from designers work on the runway in exhibitions. Fast fashion companies will actively go to exhibitions and gather current styles and outfit inspiration to replicate the styles in their stores. It takes Zara, retailer, '10 to 15 days to go from the design stage to the sales floor' (Petro, 2012). This conveys that the designer putting clothes in exhibitions holds responsibility for the designs that will then be transpired into shop floors and then taken into the consumers responsibility once purchased. The design company, La Rosa, realises this as they produced 9 'elegant effigies' but manufactured with a new sustainable method and 100% recyclable plastic meaning the designer can keep melting and remoulding different mannequins to fit the current trend at time without harming the environment whilst also upholding a high-end quality exhibition (Codha, 2018).

As having a concern for the environment and becoming more sustainable has become a trend to some companies and individuals. It is seen as a trend as their actions do not relate as strongly to their statements. Individuals will buy products from companies which represent a false narrative of their products being ethically and sustainably sourced, manufactured, transported, and sold. 'The International Consumer Protection Enforcement Network recently analysed 500 websites and found that up to 40% of environmentally friendly claims might be misleading customers' (BBC, 2021). This evidences the issue that brands are treating sustainability as a trend, in which they eventually see disappearing, as almost half of their exaggerated environmentally friendly claims are false and misleading customers.

Additionally, preserved moss walls have become a home and office interior trend as illustrated below (Greenplants Group Ltd, 2021). However, individuals purchasing these moss walls are not being informed simply that the moss on these walls are dead as they have been preserved and stopped from growing through environmentally harmful chemicals. Instead, it is advertised 'You can enjoy all the benefits of live green walls without the cost of ongoing watering and maintenance' (Greenplants Group Ltd, 2021). The company uses the

words 'live green' as opposed to alive which gives the same impression without necessarily the reader noticing the difference. Moss is well known for its advantages in creating improved air quality by removing toxins and airborne dust. Consequently, consumers are encouraged to believe they are purchasing something evidentially realistic, as illustrated below, and good for the environment and health but have been an example of greenwashing instead.



Fig 1 (Greenplant Group Ltd, 2021)

Moss is known for its natural properties to 'help remove toxins from the air and replace it with clean, fresh oxygen' (Vantage Spaces, 2021). Therefore, if the properties of the plant can be used as outdoor and indoor walls and boast the benefits if unpreserved and alive moss used it made me query if the carbon emission from all vehicles could be lessened dramatically through the use of moss throughout all roads. This concept would help to alleviate the fast fashion movement carbon emissions produced through transporting materials and garments across countries from warehouses and sweatshops to people's homes.

Greenwashing is a term which has been created to warn individuals from companies which convey deceiving information and an incorrect impression of their supposedly sustainable

brand and products. Greenwashing became aware to the public as individuals noticed after further research into brands with allegedly ethically sourced and sustainable labels that their claims were far from the truth. Greenwashing is identified within companies which offer to 'carbon offset their products, without committing to any big changes immediately' (BBC, 2021). It can most often be seen from companies which claim their garments are 'made from a sustainable fabric, even if the rest of their clothing line is damaging to the environment' or selling an 'eco-friendly version of their product, but not making all their products eco-friendly'.

Primark Cares is a separate range within the fast fashion brand Primark which pledges new commitments such as ensuring 'all its clothing is made from recycled or more sustainably sourced materials by 2030' (Primark, 2021). However, only '25 per cent of all clothes sold are made from recycled or sustainably sourced materials' to the year of 2021 states (Primark, 2021). Additionally, Paul Marchant CEO of Primark, states 'We've been working to become a more sustainable and ethical business for over 10 years' (Primark, 2021). If it took 10 years for Primark to allegedly reach producing 25% of their clothing from recycled materials or more sustainable sourced materials, it will take another 30 years to reach 100% of their clothing if they continue at their current pace. This will take them to the year 2051, not 2030. Therefore, Primark gives examples of greenwashing as they claim and loudly advertise that 25% of the garments sold are made sustainably but the remaining 75% continue to wound the world. They promise an additional 8 statements in which they aim to achieve to better the world through their brand such as promising to produce clothes that will be 'recyclable by design by 2027' (Primark, 2021).

However, all their promises are to mainly fit into the sustainability trend as every single promise is based far into the future with multiple ethical and environmental issues still evident as (Ethical Consumer Organisation, 2021) reports a lengthy list of issues found within Primark such as 'environmental reporting, pollution and toxins, workers' rights, animal rights, animal testing, use of controversial technologies, anti-social finance and likely use of tax avoidance strategies'.

A smart and efficient way to regain or maintain consumers trust with sustainability claims is to not only be true to their claims but to be completely open to being investigated on the claims. Multiple designer brands will pay to have investigations regarding sustainability on their brands so that they can not only learn where they need to improve upon but also give the

public honesty throughout their brand. Fashion designer, Stella McCartney, has produced a wool jumper costing a total of £925 and scarf neck blouse made from sustainable viscose at £520. However, the products feature a QR code in the label that outlines every stage of its “provenance journey”. This is a very efficient and satisfying process of providing the honesty on their brand to the consumer.

Biomimetic characteristics can provide basic ideas which are the stem to great and long-lasting designs. Cat’s and many other animal’s eyes, ‘have a layer of tissue behind the retina that reflects light back through the eye’ (Kapsali, 2021, p14) which creates a glow like appearance on the animal’s eye when being observed. This is stated to be the inspiration behind Percy Shaw’s invention of reflective road studs in 1933, also known as cat’s eyes. This concept idea was mimicked and built with ‘optical properties of reflecting lenses’ (Kapsali, 2021, p14). The characteristics of the cat’s eye provided the idea to a lifesaving invention guiding people correctly on the roads whilst using a vehicle at night. The invention has been beneficial to the environment and proven long lasting as it does not require any electrical source or finite resources as it reuses and reflects the light from the vehicles.

The structures and materials found within nature are the source of all best functioning designs both currently and in the future. Research into greater depth of biology structures, functions and formations that exist in materials and structures in nature will answer design flaws which contribute to the fast fashion movement. I have spoken about how if the lifespan of a garments or product is increased that it is improving on the fast fashion movement as humans will value their garment more emotionally and physically. Speedo, a swimwear company, have begun to tackle the issue of fast fashion and short life cycle garments through biomimetics as they have been researching since the 1980’s ‘drag reduction swimwear textiles’(Kapsali, 2021). 20 years later, they produced ‘FastSkin, a full-body swimsuit made from a biomimetic textile with a texture that imitates shark denticles’ (Kapsali, 2021). This textile was thoroughly researched as sharks’ skin’s denticles was replicated to give the same advantages to a competitive swimmer a shark has to its prey. This proved successful as in the Olympics, professional swimmers which wore FastSkin achieved ‘thirteen out of fifteen records broken and 83 per cent of medals won’ (Kapsali, 2021). The statistics prove here that function of the swimsuit was improved dramatically just by the changing structure of the textile to mimic a shark’s skin. This skin structure has also been used successfully across ‘drag reduction in flight’ (Kapsali, 2021).

Once understanding how individuals have always loved aesthetic and colour within fashion. As previously stated, colours can represent different meanings across all cultures. Colour is so important as it translates information to us about an individual's mood, personality, story or political stance. 'Humans perceive colour through the interaction of the light spectrum with the light receptors in the eye' (Kapsali, 2021). With this fact in mind, scientists were able to research a butterfly in order to view how they express their significantly bright colours. Prior to fast fashion, societies would express colour within their clothing and dye their clothes through natural sources such as plants mixed with water to create paste dyes. However, as we have selfishly progressed, we have been blinding ourselves to the detrimental effect that industrial dyes are highly toxic and unsustainable. However, 'morphotex', the textile which mimics the structure of the butterfly's wing scales has been created and made to a dress. The materials represent the 'basic colours of blue, green and red without the use of pigments simply by altering the distance between the ridges'(Kapsali, 2021). This fits and helps to resolve the fast fashion movement as pigments and therefore toxic to the environment dyes do not have to be used to alter the colour of the garment but instead it adjusted to the colour desired. Furthermore, as individuals will always eventually want to replace the colour of their outfit as proven how important colour is to cultures, this textile structure offers this without a new garment having to be produced and another one forgotten about.

Another previously spoken about issue linked to the fast fashion movement was the single use of products. A namib beetle lives in one of the hottest areas on the planet which receives 'less than 1.5 centimetres of rain per year' (Kansali, 2021) and was therefore analysed on how it survives in such conditions. It was found that it has a hardened forewing shell with a specialised microscopic bumpy texture. This texture is also found to be covered in a waxy material. These factors on their shell allow the namib beetle to ultimately drink the water from the moisture from the fog which appears each night and morning. The process analysed has been replicated into the already present fog harvesting process, useful in places which suffer from drought and to sustainably sourcing clean water. A team of chemical engineers developed a 'synthetic surface mimicking the beetle's back that are several times more effective than their predecessors' (Kansali, 2021). This surface and process could prove beneficial to refugee camps and army camps. I began to think of how we could minimise and erase the water production companies and the negative impact on the environment they

create, such as one-use plastic water bottles, if these were placed on buildings in cities and towns. However, further findings with this material by two individuals in Boston College created 'self-filling water bottles' which have mimicked material from the namib beetle on the inside of the bottle. The team believes that it could 'harvest 3 litres per square metre per hour in an area of 75 per cent humidity'. This invention would collect clean water naturally without the need of any energy consumption throughout the whole process.

Materials used within fast fashion are often cheap and therefore low quality to keep to costs of the total garment down. Commonly used materials are polyester and nylon which are disadvantageous to the environment greatly. These synthetics are not only harmful to the environment but are 'non-biodegradable' (Greenchoice, 2021). This means that the materials often used within garments with fast fashion never have an end of life in landfill.

Additionally, nylon produces a 'greenhouse gas 301 times more potent than carbon dioxide' while polyester uses 'large amounts of water for cooling' (Greenchoice, 2021). A good biomaterial is a material in which have been inspired and used with natural resources and methods whilst holding good material properties. Elaine Yan Ling Ng found that a disturbing 250,000 tonnes eggshells are wasted each year and decided to utilise the wasted and natural materials in order to create biomaterials. According to (Wu, 2021) she has been creating tiles for rooms in the house mainly kitchen from the biomaterial industrially for two years.

Similarly, multiple leather like consistent materials can be produced from fruit peels undergoing different sustainable processes by adding gelatine. These materials can be replaced by the ever damaging one's fast fashion brands chose to use to date.

Completing this document of research, I have realised not only the true meaning of fashion and the model it represents but how significant it is within society. I have come to find how meaningful fashion is across many cultures as many garments used to identify themselves and their belonging can tell stories. After finding the full definition and story behind a pattern on an individual's Kente cloth, I was able to truly appreciate the art of identification in their work. Alexander McQueen's mindset on fashion confirmed my beliefs that garments will eventually always come to an end life cycle evidently in his razor clam shell dress. Also, that the issues with landfill from fast fashion could be solved with a replacement of biodegradable materials or biomaterials being used within garments such as shells. He also believed, evidenced through his design work on his garments across his lifetime, that longevity must be put into the clothing which creates value of function and value to the individual meaning it

will be less likely to end in landfill. Naturistic structures, such as shark skin, and its properties were found to be used within garments such as 'FastSkin' which was statistically proven to function better under its purpose of function than previous swimwear used. Examples of how colour can be used very differently within design were found with the studies of butterflies. The material which was formed to follow the naturistic structure on the butterfly wings to simulate how pigments of different colours can be shown and seen by altering the angle of the structure is creation which could slow the fast fashion movement if used more in society. My findings within Primark's greenwashing marketing statements were alarming as I didn't expect to find so many pieces of evidence of wrongfully informing the public and consumer. I believe I have answered my title of 'The detrimental environmental effects that fashion, as a model, has on the world and how biomimetics can alleviate the given issues' as I was overwhelmed with the number of biomimetic products and garments invented or on the market and how they can help to alleviate issues related to fast fashion. However, I was shocked to find as much evidence of how fashion, as a model, has advantages to society and history but certainly not environmentally.

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