

The significance of the introduction of synthetic dyes in the mid 19th century on the democratisation of western fashion

Sam Vettese Forster¹ and Robert M Christie^{2,3}

¹*School of the Creative Industries, Merchiston Campus, Edinburgh Napier University, EH10 5DT, Edinburgh, Scotland, UK*

²*School of Textiles and Design, Scottish Borders Campus, Heriot Watt University, Galashiels, TD1 3HF, Scotland, UK*

³*Department of Chemistry, Faculty of Science, King Abdulaziz University, Jeddah, Saudi Arabia*
Emails: s.forster@napier.ac.uk, r.m.christie@hw.ac.uk

From the middle of the 19th century, fashionable garments for women, which had previously been restricted largely to the wealthy social classes, began to become much more widely accessible in society. Many factors contributed towards this change, including the invention of the domestic sewing machine, the growing popularity of the 'fashion magazine', the introduction of department stores and the development of ready-made fashions, as heralded in particular by Charles Worth. However, an element that had an especially profound influence on this democratisation process was the discovery of synthetic textile dyes and their rapid industrial development, initiated famously by William Perkin's *Mauveine*, which resulted in the availability of a wide range of new bright colours for use in garment coloration. This paper contextualises the influence of the commercial introduction of these dyes in the mid 19th century on the adoption of fashionable dress by a much wider section of the general population.

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Introduction

Until the mid 19th century, the ability of Western women to follow changing decorative styles in clothing had been restricted, more or less, to the wealthy [1- 4]. It was around this period in history that those aspects of women's dress regarded as fashionable, such as the fabric types, silhouettes, trims and the wide colour range, started to become available to much broader and more varied sections of society [1-5]. These democratic changes were observed most significantly at a time coinciding with the discovery in 1856 of *Mauveine*, the first industrially-produced synthetic textile dye, and the consequent popularity of fashionable dress dyed in the mauve colour that this dye provided. Within a relatively short period of time, a range of so-called *aniline dyes* had been discovered and introduced, providing access to a much wider range of bright colours for textiles. Newly-created fashions in women's wear, using the colours of these dyes, in various forms and of varying qualities, became more and more accessible to the wider population, and this led to the beginning of overlapping social class attitudes in the context of women's fashion.

This paper, the result of a unique collaboration between two individuals with complementary interests in fashion and in colour chemistry, assesses the impact of the emergence and increasing availability of synthetically-dyed textiles on the democratisation of European fashion, examined in the context of other concurrent, influential developments. The paper is based on a survey of primary documents and historical articles, together with an evaluation of dye, textile and costume archives, in particular those in the Victoria and Albert Museum, London, which provided the source of the illustrations used throughout the paper of selected costume items from the relevant historical period.

The dress conventions of western women in the early 19th century

A variety of circumstances surrounding the manner of Western women's dress before the mid 19th century provided a situation within the various sections of society which undoubtedly contributed towards the changes that were about to take place following the landmark discovery of the first industrial synthetic dye. The dominant factor that separated the social classes at the time in terms of their choice of dress was the cost, and hence affordability [6,7]. Dress shapes, even those considered as 'simple', were actually quite elaborate, making use of large quantities of fabric and trims, and were hand-sewn [8]. The dyeing of textile fabrics with natural dyes, which was the only means available for textile coloration, was an expensive part of the production process, especially when the aim was to provide strong, bright colours [9]. However, although cost was central, it was by no means the only factor. As an example, in France before the mid 19th century, there were particularly complicated dress codes, for example within marriage, between social classes and also as a response to rules set by the régime in power at the time [10]. During the *Ancien Régime* before the French Revolution, society was divided into three estates. For a period, the Third Estate, consisting of commoners, as opposed to the clergy in the First Estate and the nobility in the Second Estate, tended to wear dark, simple shapes. For men and women, these were symbolic of belonging to a refined society and were arguably a protest against aristocratic excess. Immediately after the Revolution, women's dress within this social class was 'allowed' to become more lavish. In conjunction with these issues, there were codes which had to be addressed in fabric distribution, tailoring and construction of ready-made garments, and even in the sale of second-hand garments in various levels of condition, through régime-approved markets. During the *Ancien Régime*, the production and selling of clothing was confined to specific outlets, determined by guilds with complex sets of regulations. Textiles and their accompanying adornments had to be purchased and made up into garments in separate establishments, according to these regulations. These principles and traditions survived the Revolution. In addition, the second-hand clothing industry in France carried with it a convoluted set of rules. The guild of fripperers, who supplied most of the inhabitants of Paris with second-hand clothes, had been in existence since the beginning of the 13th century. Originally its statutes gave it the exclusive right to repair and re-sell old clothing. In 1430, the guild obtained a decree permitting it to work with new material. For the first time in 1664, it was allowed to make new garments, although not to carry out measurements on individuals [11,12].

In Britain and North America, there were also codes of conduct with regard to women's dress. For example, it was considered 'proper' for married middle and upper class women to wear clothing in rich colours, with heavy adornment, as a reflection of their husbands' status [9]. Unmarried young women from similar backgrounds were expected to wear 'simple' dress designs, in pale colours [6,13]. For the women from these classes, several costume changes were required at particular times of the day and for particular activities [14,15]. 'Aristocratic idleness' was seen as an appropriate way of life.

Fashionable clothing for women during this period was restrictive and ornamental, often constructed from delicate fabrics and in bright colours [16]. The rather impractical aspects of the clothing construction included, at various periods, tightly laced corsets, wide crinolines and long trains, which had a tendency to impede even normal activities such as climbing stairs or walking the streets [6,17]. A radically different situation existed within the lower social classes. Servants commonly inherited garments that were damaged, faded or had lost favour with their employers. They either retained and wore the garments, sometimes after carrying out alterations, or sold them [18]. There was indeed a thriving second-hand clothing trade in Britain [19]. Working class, unmarried women commonly spent a large proportion of their income on such garments, in attempts to emulate the perceived style of the British aristocracy, rather than the more modest French middle class way of dressing [20].

At the beginning of the 1850s, a burgeoning middle class and a less impoverished working class emerged from the industrial revolution. Victorian Britain experienced the beginnings of aspirational, conspicuous consumerism, reflected in the clothing choices made by women. The Great Exhibition of 1851 was, at least in part, aimed at this new customer audience, in addition to its exposition of Britain's industrial 'superiority'. The exhibition was advertised widely and there was an initiative to include days when the entry cost was set at a shilling, which was affordable to working class groups. More than six million visitors were attracted to attend the exhibition [21,22]. The British exhibits were given particular prominence. On show alongside the machinery, were innovative, complex textiles produced using the jacquard loom and also with copper-plate printed features incorporating added block-printed colours [23,24]. Many of the exhibits were expensively produced and not easily reproducible, and these would have had minimal influence on the dress style of working class women. However, exhibits of brightly-coloured, woven, embroidered and printed ribbons produced in Coventry, and also examples from Lyon created in silk, proved to be more influential in that these items were to become highly popular in the dress of women from a wide range of backgrounds [25].

Thus, there was a variety of aspects of colour and its use in fashionable textile products around the mid 19th century that set the scene for the widespread enthusiasm for the synthetically-dyed fashion textiles that were to emerge in the years that followed.

The democratisation of fashion from the mid 1850s

A number of factors came together to influence the process of the democratisation of fashion in Western women's clothing which began around the mid 1850s. A significant influence was the development of the railways, which facilitated not only personal travel but also the distribution of goods. Other important factors included the growing availability of fashion magazines, the invention and popularisation of the use of the sewing machine, the development of draft paper pattern systems, developments in the ready-made clothing industry, the emergence of the department store and, not least, the revolutionary innovations which made synthetic dyes available for textiles [26-32].

Fashion magazines played a highly influential role in raising the interest in fashion for a middle and upper class readership during the 19th century [32,33]. The removal of the tax on paper in 1854 was an important factor that facilitated the introduction of a number of relatively low cost fashion magazines, which brought an awareness of fashionable styles to a broader range of society [6,20,34]. At the time, it was evident that, irrespective of the cost of a particular magazine or of its target market (whether aristocratic or lower middle class, British or American), the plates tended to illustrate idealised high Parisian fashion. Godeys, an American 'fashion' magazine in April 1857 stated, "We are constantly asked if Americana are not a year behind Parisian styles. This is no longer the case. Our principal

importers have their partner or their resident agent abroad, and now that steam has shortened the transit from continent to continent to a ten days jaunt, there is no reason why our fashionable ladies should be more than two weeks behind the belles of Long Champs." [35].

Although versions of the sewing machine had been around for some time, the Singer 'foot-treadle' model that became available in 1854 was more affordable for middle class domestic and small business use [20]. While the expertise of the dressmaker retained importance in the creation of the types of dresses that were in demand, machines increasingly took much of the labour out of the production process, particularly for long hems and seams [36]. At around the same time, a range of printed paper patterns became available, prepared using a variety of systems and often supplied within the fashion magazines [20,37]. These innovations increasingly provided home and amateur dressmakers and sewers with techniques that enhanced their abilities in garment production and gave new groups of women access to stylish cuts which would transform their work patterns, their appearance and their experience of fashionable dress [20]. Women who had previously been satisfied with out-of-date clothing, or had struggled with the difficulties of the draping methods that were traditionally used in home garment construction, found that they were able to draft new dress styles more easily. In May 1896 'The Queen of Fashion' publication reported, "The average woman, whether on the farm or in the city, wishes to use everything to the best advantage, consequently there are very few who do not renovate and make over their old dresses when they have grown too old to be presentable." [20]. Even if the systems failed to achieve a perfect fit first time, it was probably simpler to make the necessary alterations than if the dress had been cut using traditional draping methods. The home dressmakers probably also found the new processes more rewarding than those involved in restyling an old dress [20,37]. The systems that were becoming available must have been especially appealing to women with difficult fit issues who were unable to afford the services of a professional dressmaker [20].

A further important factor in the fashion democratisation process during this period was the emergence of the department store. These outlets made a range of wares more accessible to wider sections of society, including textiles, and thus essentially de-specialised fabric retailing [10,28]. In department stores, textiles were more attractively displayed in the bright daylight of the large shop windows and in airier spaces, in contrast to the rather gloomy, restricted conditions generally encountered in the premises of dressmakers or haberdashers [10]. Brightly-coloured fabrics and goods were given particular prominence to attract customers [28,30,38]. In the department stores, ready-made fashion items were not produced, stocked and sold in various sizes, as is the contemporary norm, even in the case of 'simple' women's dress of the time [7,10]. Fashion items by the designers of the day, most notably Charles Frederick Worth, were commonly bought by department stores and copies made up in-house in the client's size and using fabrics bought within same store [39], although Worth did design certain textile products which were manufactured for sale through selected department stores [40,41].

In the manner that Worth licensed and distributed his designs commercially throughout the world, he may be considered as the creator of the ready-made fashion industry [39,42]. He has thus also been credited with the 'invention' of the designer label [39,43]. During the 1860s, *haute couture*, which involved the presentation of a collection of models from which a complete dress, or parts of it, could be selected, came to replace *couture a facon*, or dressmaking for the individual. In *couture de facon*, the dressmaker was generally a technician executing the production of an outfit with the design and the fabric pre-selected by the client [43,44]. In *haute couture*, a design house supplied both the design ideas and the selection of fabrics, often having fabric produced according to its own designs [43,44]. Within a single establishment, successful models and fabric combinations were repeated on occasions

to be sold directly as personalised copies for certain clients, either immediately or at the end of a season, or alternatively were made up into ready-made costumes [39]. Local dressmakers not only copied Worth's designs, but also made up garments from textiles and embellishments used by the house of Worth, either as exclusive designs commissioned by the house, or as fabrics distributed by the textile manufacturers [11,40].

Charles Worth was without doubt an important influence on the democratisation of fashion, the 'ready-made' aspect of his designs encouraging a broader spectrum of society to indulge in fashionable dress. The novel approach by an individual designer to create and influence fashions within society contrasted with the prevailing system where patrons dictated what they wanted to the dressmaker. Worth occupied a position of superiority in that he created his own designs epitomising the fashionable styles of the period rather than copying the designs of others. He was responsible for clothing many members of European royalty and aristocracy, particularly Empress Eugenie of France who was a fashion icon of the time, as well as the French upper class and the *demimonde* of courtesans and actresses, who in turn served as fashion leaders [11]. He also had a significant range of American clientele [12,40]. As a confirmed fashion leader, Worth's use of bright colours and combinations of colours, is of particular note. In a study by Coleman, there were many reports from *The Ladies Treasury* (1870s-80s) that highlighted this feature, for example, "in the fall of 1882, a rich damask - violet with old gold dahlias - was made up as a 'Calypso' evening dress. The colours - bright aqua combined with peach and white and crimson and white - are certainly appropriate to the period", "the Parisians [wearing dresses by Worth] had discovered the secret of uniting the most rebellious colours - plum and sky blue, yellow and bronze, pink and red, and blue and green - with the last two joined together in nature so successfully, but elsewhere not always" and "knowing this taste for showy colours, Worth combines his dresses for his Italian customers accordingly and thus, through a variety of colours are at times combined in one dress they are so combined that they always harmonize" [40].

The development of synthetic dyes

Fashionable colours pre-1856

Textiles were coloured exclusively with natural dyes until the introduction of the first synthetic dye produced on an industrial scale in 1856. It is a feature of natural dyes, that they generally provide rather muted, dull colours. However, with selected dyes and with processing conditions optimised over centuries, it was possible to obtain reasonably strong, brightly-coloured dyed textiles. Several pristine examples exhibited in the Victoria and Albert Museum, London, such as those illustrated in Figures 1-3, provide a demonstration of this feature.

In a study by Cunnington, he expressed the belief that such textiles were not completely prohibitively expensive, saying "It is singular that vegetable dyes should have at last have arrived at such a pitch of excellence only to be driven from the market in the 60s by the aniline dyes. It will be seen from the actual prices given in the annual summaries that materials were, on the whole, cheap, and labour inordinately so." [17]. However, other documents provide a contrast with this opinion alluding to the expense of brightly-coloured textiles and the garments made from them pre-1856, particularly those in shades of purple [36,41,45]. Interest in such colours was strongly influenced by their exclusivity, for example as worn by royalty, especially as a result of reports in the emergent popular fashion magazines [29,32]. Indeed, Worth's fascination for brightly coloured garments was influenced by the fact that they were worn by aristocracy, both current and past [40,45]. By the mid

19th century, the requirements of fashion trends emerged as a new determinant for the use of colour in the textiles industry.



Figure 1 (left): 'Promenade dress' (bodice and skirt) in silk plush (1855), predating the introduction of synthetic dyes, The Victoria and Albert Museum, London.

Figure 2 (middle): Detail of the fabric and silk fringe of the dress shown in Figure 1 (1855), The Victoria and Albert Museum, London.

Figure 3 (right): Pre-synthetic blue moiré dress trimmed with chenille (1858), The Victoria and Albert Museum, London.

Textile dyes pre-1856

Textile materials have been coloured with natural dyes for many centuries [46-53]. Since most of nature's dyes are rather unstable, the dyeings produced in the very early days tended to be fugitive, for example to washing and light. However, over the years, optimised dyeing procedures, often quite complex, were developed using a selected range of natural dyes to provide dyeings of reasonable quality on textiles. Since natural dyes generally have little affinity for textile materials, they were commonly applied together with fixing-agents known as *mordants*. These agents not only improved the fastness properties of the dyeings, but also in many cases were essential to develop the intensity and brightness of the colours produced. The most important natural blue dye is indigo obtained from plant sources, for example *indigofera tinctoria* found in Asia, and woad, *isatis tinctoria*, a flowering plant grown in Europe and the USA [54,55]. Dyeing was carried out in a vat where the fermentation of composted leaves took place in the presence of alkali from wood ash or limestone to produce dye precursors which are converted by reaction in air to indigo on the fibre. In these ways, indigo produces attractive deep blue dyeings of good quality, and without the need for a mordant. A related product is Tyrian purple. This was for many years a fashionable, aristocratic purple dye extracted from the glands of *Murex brandaris*, a shellfish found on the Mediterranean and Atlantic coasts. It is said to have required the use of 10,000 shellfish to provide one gram of dye, which no doubt explains why the luxurious, bright purple fabrics were available only to the ruling class elite in early Mediterranean and Middle Eastern societies, and also the consequent association of the colour purple with wealth and nobility [56,57]. Natural red dyes were derived from botanical (madder) or animal (cochineal, kermes and lac insect) sources. There is a wide range of natural yellow dyes of plant origin, one of the

best-known being weld, obtained from flowering plant species such as *reseda luteola*. These red and yellow dyes generally required mordanting. Natural green textile dyes proved elusive, because the common plant pigments such as chlorophyll could not be made to fix to natural fibres and faded rapidly.

Mauveine

In the 19th century there had been some experimentation with products of chemical synthesis applied in the coloration of textiles. For example, picric acid had been used to provide bright yellow colours, although with inadequate fastness properties. There had also been some adaptation of the processes leading to the long-established synthetic inorganic pigment colours, including Prussian blue and 'laked' products, to produce colours on textiles [58]. However, none of these processes came close to having the impact on industry and society of the landmark discovery that was to follow. The foundation of the synthetic dye industry is attributed to Sir William Henry Perkin on account of his discovery in 1856 of a purple dye which was to become known as *Mauveine* [59-63]. Perkin was a young, enthusiastic British chemist who was carrying out research not initially aimed at making dyes but rather at developing a synthetic route to quinine, the antimalarial drug. Malaria was a devastating condition at the time and natural quinine, often in short supply and expensive, was the most effective treatment. Unfortunately, his attempts to this end proved unsuccessful. As an extension of his research, he turned his attention to the reaction of aniline, a chemical which had become readily available from the processing of coal tar, with potassium dichromate, another common chemical material. This reaction gave a black product, which might have seemed rather unpromising to many chemists, but from which Perkin discovered that a low yield of a purple dye could be extracted with solvents. An evaluation of the new dye in a silk dye works in Perth, Scotland, established that it could be used to dye silk a rich purple colour and give reasonable fastness properties. The manager of the dye house was Robert Pullar. The positive response from Robert Pullar to the dyeing trials, and also his technical assistance from his experience of the application of dyes to textiles, proved to be vital to Perkin's decision on how to proceed with his discovery, since other traditional dyers of the time proved more sceptical towards the revolutionary concept of using a dye from unnatural sources [62, 63]. The particular colour of the dye that had been discovered by accident was highly significant. It offered a potentially low cost means to reproduce the rich purple colour which was formerly obtainable from Tyrian purple, the use of which had been more or less discontinued centuries before. The colour was certainly superior to the 'false shellfish purples' of the time, which were extractable from lichens and to the dull purples associated with mixtures of red and blue natural dyes, such as madder and indigo. Perkin showed remarkable foresight in recognising the potential of his discovery. He took out a patent on the product and had the boldness to instigate the development of a large scale manufacturing process, using his father's life savings to build a factory at Greenford Green, near London to manufacture the dye. Mauveine was launched on the market in 1857 and enjoyed rapid commercial success. At various stages of its development as a commercial product the dye was referred to as *Tyrian Purple* or as *Aniline Purple*. Later, it was re-named as *Mauve*, and later still embellished as *Mauveine*, to convey a French flavour. There was evidently more perceived benefit in marketing the product from the association with Parisian haute couture than with the purple of antiquity.

The discovery of Mauveine in 1856, according to several accounts from historic sources, led rapidly to a widespread fashion trend. John Pullar, Robert's father, was reported to have said to Perkin, "If they [bourgeois ladies] once take a mania for it and you can supply the demand, your fame and fortune are secure." [45]. By May 1857, John Pullar was able to inform Perkin that 'a rage' had begun

for the new colour to the extent that in only a few years it outstripped the competitor products based on the natural purple dyes. Through its unique colour, it became highly desirable in the fashion houses of London and Paris. As an example important to the marketing of the product, Queen Victoria wore a mauve dress to her daughter's wedding [53]. Even in Charles Dickens's periodical 'All Year Round', published in September 1859, he said, "As I look out of my window, the apotheosis of Perkin's purple seems at hand – purple hands wave from open carriages – purple hands shake each other at street doors – purple hands threaten each other from opposite sides of the street; purple – striped gowns cram barouches, jam up cabs, throng steamers, fill railway stations : all flying countryward, like so many birds of purple paradise." [62]. At the same time, some conservative commentators frowned upon it. The British periodical *Punch* complained that London was afflicted with 'Mauve Measles' [45]. Examples of dresses dyed with Mauveine from the period are shown in Figures 4 and 5.



Figure 4 (left): Mauveine silk dress (1873), The Victoria and Albert Museum, London.

Figure 5 (right): 'Home-made' Mauveine striped dress with lace and machine stitching (1870s), The Victoria and Albert Museum, London.

The development of synthetic dyes post-mauveine

In the next few years following the discovery of Mauveine, research activity towards the development of other synthetic dyes intensified especially in Britain, Germany, and France. For the most part, chemists concentrated on aniline as the starting material, and this resulted within a very short time period in the discovery of several other synthetic textile dyes with commercial potential. In fact the term 'aniline dyes' became for many decades synonymous with synthetic dyes. The most successful product which immediately followed Mauveine was *Fuschine*, a rich red dye, also to become known as *Magenta*, which was introduced in 1859 [62,64]. A costume from the period dyed with Magenta is illustrated in Figure 6. Subsequently, and very rapidly, a range of new dyes, providing a wide range of bright fashion colours emerged - yellows, reds, blues, violets and greens, as well as browns and blacks. These dyes proved to be superior not only in colour to natural dyes, but they were also found to be easier to apply and more economic. The new synthetic dyes that had been developed were also superior in performance to Mauveine, and its production ceased after about ten years [62].



Figure 6: Magenta dyed silk bodice, skirt, peplum and bow (1869-1870), The Victoria and Albert Museum, London.

Following the trend set by Mauveine, fabrics dyed with the new range of synthetic dyes also became fashionable. In the 1850s, Empress Eugenie of France was a fashion icon, her coveted style documented in various texts, including the fashion publications of the time [65]. She was a primary patron of Charles Worth and has been quoted as saying that the new mauve ‘matched her eyes’ [66,67]. In *The Englishwoman’s Domestic Magazine* of 1861, between May and October, the dresses of the Empress Eugenie, coloured using aniline dyes, were described in detail in every issue. Queen Victoria was also an aspirational figure in womens’ fashion. Her fashion choices were also extensively disseminated through these media, notably the mauve dress that she wore to her daughter’s wedding in 1857, as described in the *Illustrated London News* [67].

As in the case of the Great Exhibition of 1851, the new emerging middle class and sectors of the working class were courted as important customers at the London Industrial Exhibition of 1862. Again, one shilling tickets were offered and visitors exceeded six million. In contrast to the paradigm of the 1851 Exhibition, which encouraged conspicuous consumerism through the display of popularised technology and overly ornate and innovative products, the 1862 exhibition influenced the colour choices of women in more tangible ways. Examples of textiles coloured with Perkin’s aniline dyes were exhibited alongside jars of ‘black coal tar waste’. This was reported as a popular and aesthetically pleasing display [68]. Queen Victoria was observed to attend the exhibition on ‘shilling days’ and, on occasions, wore a mauve dress, in spite of being in mourning for her husband [69]. By the 1860s, roller printing had been developed to a high standard within the textile industry and printed fabrics were on show using up to eight colours, extravagant in nature and often based on aniline dyes [70]. These features cemented the reputation mauve and its successors in the opinion of the public.

From the 1860s onwards, the textile dye industry flourished and a host of new products were developed and introduced. The innovations were facilitated by the dramatically enhanced understanding of the principles of organic chemistry which was emerging. Not only was the use of natural dyes disappearing rapidly, but synthetic equivalents were being developed, of higher purity, less expensive and easier to apply than their natural counterparts. The introduction in 1868 of

synthetic alizarin, which is the synthetic derivative of the main component of natural dyeing with madder, made pinks available at a lower cost. This dye proved to have a longer lasting effect than that of the more celebrated Mauveine and Magenta [17,41]. Indeed, most of these earlier dyes were superseded in the 20th century by technically-superior products.

Fashionable colours after the introduction of synthetic dyes

The pervasion of the bright colours provided by the synthetic dyes for fashion was not always received with approval, according to several documents of the time [17,36]. In the early 1860s, the French writer Hippolyte Taine was repeatedly struck by the 'outrageously crude' colours and 'want of taste' in the dress of British women. His *Notes on England* lists 'violet dresses of a really ferocious violet, purple or poppy red silks, grass-green dresses decorated with flowers, azure blue scarves and dresses of purple silk, very shiny so that they reflect the light dazzlingly, or of stiff tulle on a substructure of skirts, bristling with embroidery, immense shawls of black lace falling to the heels, immaculate white or bright purple gloves. The glare and glitter is brutal' [71]. The Englishwoman's Domestic Magazine of March 1868 recommended that there should be "no more than 'two positive colours in a lady's toilet", "very bright tints should be toned down with white, black or grey to prevent a gaudy appearance" and that "two shades of the same colour were considered very fashionable, particularly if the trimmings were of a contrasting fabric" [72].

The emergence of 'democratic fashion' was followed in time by a movement against the bright colours with which it was originally associated, in a movement akin to cyclical modern fashion trends. [6,11,40] It was noted, for example in fashion magazines, that the synthetic brights had become popular in the dress of the lower classes and were used in garments of 'inferior quality' [20,37]. Godeys in 1872 stated, "Unmixed colours and all high colours, such as bright crimson, scarlet, clear blue and green have disappeared from choice goods and are only found in cheap materials made for the million." [73]. Other authors suggested that consumers became disillusioned with the inadequate fastness properties of some of the early aniline dyes [17]. The colours that became fashionable from around the late 1860s were duller shades. It has been noted that antique and 'exotic' effects were frequently sought after and the most desirable colours were described as 'old-looking', 'strange' or 'indescribable tints' [56]. Colours such as blacks, greys, 'drabs', 'modes' and unspecified browns and blues remained popular throughout the period [17,20,56]. The trade publication *Textile Colorist* noted in 1883 that "The bright colours, however, are out of fashion, and subdued shades which are produced by mixtures are preferred" [74]. Hummel advocated the use of mixtures of synthetic dyes to produce such shades. He commented that 'the most thoroughly pleasing and attractive shades of greys and olives and browns were made by mixing brilliant colors, whereas, if they were confined to the old dyes the colours of dress materials would be very dull and dingy' [75].

The Aesthetic Movement, which was influential at the time, and their concepts of 'natural' colours that were in harmony with their environment had an influence on the shades used in fashionable dress, even if 'rational dress' designs did not pervade democratic fashion [17]. Writings on the 'ideals' proposed by this movement found their way into popular fashion magazines in simplified forms [20]. Mary Eliza Joy Haweis wrote for Godey's in 1870 saying, "The truth of the matter is, a colour may be too pure, and of late our manufacturers urged on by the vulgar craving for gaudiness, have so much advanced in colour distilling and dyeing that our modern colours are hideous through their extreme purity. Hence colours faded by age are often more beautiful than their pristine freshness." [76]. Examples of costumes illustrating these fashion trends are shown in Figures 7 and 8.



Figure 7 (left): Bodice and skirt in wool and silk in 'antique' shades (1885), The Victoria and Albert Museum, London.

Figure 8 (right) : Detail of peach / terracotta woven silk skirt (1885), The Victoria and Albert Museum, London.

The Arts and Crafts Movement had a fairly wide-reaching influence on fashion that culminated in the particular garment shapes and colours that became prevalent at the turn of the 20th century [77]. Its practitioner, Edwin Godwin, took responsibility for the Liberty dress department in the 1880s, and a consequence of his involvement was that models of the gothic revival, involving strongly but naturally coloured garments, were sold in department stores throughout Europe and in New York [78]. In addition to her writings in magazines such as Godey's, Annie Jennes Miller published the popular American journal 'Dress' from 1887 to 1897, dedicated to the reform dress movement with paper patterns for artistic dress styles that could be made at home [79]. The American version of the Arts and Crafts movement adopted a more commercial attitude and spread its ideals to a wider public, while still eschewing the 'truth to materials' approach [80].

Changes in mid to late 19th century western fashion

While several distinct factors contributed to the democratisation of Western fashion in the mid 19th century, the role played by colour stands out. This feature owes much to that fact colour provided such a high level of visual impact and that it was easy to make changes using colour, contrasting with the complexities of modifications through pattern cutting or garment construction, especially in the ornate, elaborate garments for women that were characteristic of the time [36]. As a consequence, colour preferences became a dominant feature of fashion, and they began to change at a faster pace and become cyclical. In the second half of the 19th century, the roles and activities of women within the home and workplace entered a state of flux, although rather less dramatic than occurred at the turn of the 20th century. The changes that were taking place would often be symbolised in the detail of fashionable dress, with colour as a vital factor. The 1850s were considered as an 'age of display', showing 'fashionable extravagance' and 'ornament', where "the growing dimensions of the skirt seemed to symbolise woman's increasing place in the world" [6,7].

The reduction in the cost of dyeing which followed the introduction of synthetic dyes, brought about mainly by the economies of high volume manufacture, the fact that less dye was required and the simplified application processes, enhanced the availability of brightly-coloured textiles and had an obvious influence on their popularity. They became increasingly available to lower classes within Western society that had previously been restricted to either simple, low quality garments in drab colours, or faded second-hand goods, that inevitably and obviously appeared 'out of fashion'. The dyers who responded to the use of Perkin's Mauveine and its successors in the production of textile products were clearly aware of the opportunities that this provided [56]. The ability of the lower classes to afford new garments that were similar in both quality and colour to those worn by the higher classes, including their employers, began to pervade society [6,11]. A letter in a women's magazine from 1876 said, "My income is small but I have to keep up a good appearance and am therefore obliged to keep two servants, a cook and a housemaid. The cook I have had for nearly two years, and I have got on very well with her until the last few months. By degrees she has been getting gayer in her dress of late, and last Sunday when she started off for church, she wore a black silk made exactly like the new one I had sent home in the beginning of winter, and a new bonnet which I am certain I saw in Madame Louise's window in Regent Street marked 25s. She looked as if she had stepped out of a fashion plate, all but her boots and gloves." [6].

Items of clothing were the principal consumer goods that were becoming accessible to working-class female employees, and they often spent substantial proportions of their incomes on them [1,9,30]. Working women, even those in jobs where 'sensible' garments were preferable, were known to wear fashionable, often impractical dress with corsets, tight fitting sleeves, bows and, in particular, crinolines. In their leisure lives, young employed working class women often aimed to emulate bourgeois clothing in an exaggerated manner, with bright, clashing colours as a dominant element [81, 82]. Stansell said of the women in the Bowery subculture of the late 1900s, "they were distinguished by their self-conscious 'airs', a style of dress and manner which was a studied departure from ladyhood, an implicit rejection of bourgeois female decorum. Genteel rules of gender dictated that 'womenly' women minimise what they saw in public of others and what others saw of them. The respectable women on the street deflected, rather than drew, attention to her physical appearance. (...) Muted colours, a costume that covered the flesh except for the face were the hallmarks for a lady. Bowery fashions repudiated genteel principles of harmonious dress for their own internal logic of colour, pattern and accessories. Women wore startling combinations of colours, a sharp contrast to the modest pastels, grays and browns of ladies street wear" [81]. In Schreier's study of young Jewish immigrant workers living in New York, working in the garment industry in the late 1900s, he said, "for these women, dressing in fashionable clothes was their way of showing their knowledge of American culture, of rejecting their traditional ethnic culture, and of expressing their own identities. Although they had little money, they competed with fellow workers to emulate the latest styles, particularly favouring brash, brightly coloured outfits and preferred to be 'intentionally overdressed' to 'put on style'. Asserting their cultural agency, working class women actively created their own standards of dress." [83].

The cognitive perception of both wearers and observers of fashion, and the acceptance followed by rejection of the brightly coloured fashions of the mid 19th century combined aspects of emotionally-driven aspiration, in response to fashion and consumerism and, more instinctive, biological responses to the 'prettiness' of the colour. Although 'fashion' was in its infancy, cyclical features involving acceptance, rejection and 'etiquette', which are evident in contemporary fashion styles, began to develop. This was documented, for example, in the British publication 'Guides to Good Taste in Dress' which informed the readership of the precise rules of colour, using persuasive terminologies of the

period [17]. The fashion colour cycles mirrored the ideals of society at particular times. There was a recurring swing from females being valued either as 'carefree' or 'conscientious' on the path to emancipation. This observation accords with conclusions from Gosling's contemporary research which draws parallels of 'fashionable dress' with 'openness', 'showy dress' with 'extraversion' and dark, plain, formal dress and refined appearance with conscientiousness and, conversely, neuroticism [84]. In addition, cyclic choices in clothing were often an aspirational reflection of the personality of the wearers and their perceived class status in society [17]. This is mirrored in Norman's contemporary research into emotional aspects of design, with fashion responding to customer 'confusion' and fulfilling individual emotional needs. Through fashion, the wearer can 'suggest' one's self image and place in the world, age, gender, outlook and 'advertise to the rest of the world what a superior, tasteful, 'with it' person you are' [85]. Norman's research has also identified the universal cognitive perceptions of bright colours. Human beings are biologically attracted to bright colours on a visceral level as 'pretty'. In the world of design, 'pretty' is generally frowned upon, denounced as petty, trite or lacking depth and substance [85]. This factor may have contributed towards the rejection of bright colours for dark colours by more wealthy, 'intellectual' sections of 19th century society, as described by Cunningham [17].

Conclusions

The concept of changeable 'fashion' for large, not always wealthy, sections of Western society began in the mid 19th century. Working women and staff of the aristocracy commonly wore clothing that may have been 'fashionable' at one time, but was in an altered, second-hand and perhaps faded state. Inexpensive fashion magazines began to appear, and their popularity raised interest in the new possibilities and directions that were becoming available. A range of other factors also raised the profile and availability of fashion in society, including the introduction of sewing machines, draft paper patterns and ready-made clothing sold in accessible department stores which were able, through licensing, to copy designs by influential fashion 'designers'. However, the introduction of the first synthetically-dyed fabrics and the garments constructed from them had a special place in the democratisation of fashion. As garments became easier to make and designer styles easier to access and emulate, and as corsetry became cheaper, similarities began to appear in the nature of the silhouettes of clothing worn by both the wealthy and lower classes. As ready-made, new clothing became more attainable, individuals were able to add second-hand, fine 'fripperies', removing the necessity to wearing entire, washed-out outfits, a further illustration of narrowing differences between social class attitudes. Bright colours had long been associated with wealth and nobility and so they were received wholeheartedly when they became reasonably available. As Charles Worth used synthetically-dyed, bright colours in his designs, so his wealthy patrons and the stores that licensed his designs followed suit. This was followed by a trickle-down effect to the lower classes, who found that they could afford and copy the 'look', although commonly in a slightly lower quality of garment. The new phenomenon of the levelling out of class differences in their attitudes towards Western fashion appeared to lead, in response, to wealthier individuals seeking to set themselves apart by rejecting the synthetic bright colours, or alternatively by combining them with other colours in a more 'intellectual' way. 'Harmonies', 'tasteful' combinations and palettes that corresponded with surroundings, following the doctrines of the Arts and Crafts movement, became the 'superior' fashion. It also appears that, after having been denied vibrant colours for so long, many individuals from the lower classes wore them for longer and also exaggerated the colour combinations, as exemplified by

the Bowery and Jewish immigrant workers, described by Stansell and Schreier,. This might have been as a result of individual preference, through the development of peer-group fashion or from a lack of understanding of Arts and Crafts tenets and the minutia of differences in shades, tones and colour fusions.

Although, after the period when there was an initial blending of attitudes, during which Western women from upper, middle and lower classes were participating in fashion, wearing the bright colours of Mauveine and the other aniline dyes, there followed a separation of the classes based on 'taste'. Western women's attitudes towards fashion began to splinter, not only between the wealthy and poor, but also between groups with different ideologies, such as intellectuals and feminists, with different commitments to their causes expressed through garment choices. Colour continued to have meaning and expression in fashionable clothing throughout the 19th and early 20th century. For example, the mauve shade continued to be regarded as an appropriate colour in which a widower might remarry. Bright 'violet', when worn with green and white, has been suggested as conveying a secret affiliation with the suffragette movement [86,87]. Perhaps most significantly, at the beginning of the 20th century, Chanel 'invented' the 'little black dress', using inexpensive, synthetically dyed wool jersey, as a response to the ability of colour, in fashion, to signify status.

Sir Willaim Henry Perkin's contribution to society surrounds us daily. His efforts led to the start not merely of the synthetic dye manufacturing industry and its contribution to textiles and fashion. This was also the start of the chemical industry, leading ultimately to the growth of such industrial giants as ICI in the UK, BASF in Germany and DuPont in the USA, and the immense range of products that we have come to rely on as a society today, including cosmetics, perfumes, paints, plastics, detergents, pesticides, explosives and pharmaceuticals. The subtitle of Garfield's book, 'Mauve – How One Man Invented a Colour that Changed the World', [62] does not exaggerate Perkin's legacy.

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