P.A. Sykas: Textiles for dress 1800-1920

Textile fabrics are conceived by the manufacturer in terms of their material composition and processes of production, but perceived by the consumer firstly in terms of appearance and handle. Both are deeply involved in the economic and cultural issues behind the wearing of cloth: cost, quality, meaning. We must look from these several perspectives in order to understand the drivers behind the introduction of fabrics to the market, and the collective response to them in the form of fashion. A major preoccupation during our time frame was novelty. On the supply side, novelty gave a competitive edge, stimulated fashion change and accelerated the cycle of consumption. On the demand side, novelty provided pleasure, a way to get noticed, and new social signifiers. But novelty can act in contradictory ways: as an instrument for sustaining a fashion elite by facilitating costly style changes, and as an agent for breaking down fashion barriers by making elite modes more affordable. It can drive fashion both by promoting new looks, and later by acting to make those looks outmoded. During the long nineteenth century, the desire for novelty was supported by the widely accepted philosophical view of progress: that *new* also implied improved or more advanced, hence that novelty was a reflection of modernity.

This chapter examines textiles for dress from 1800 to 1920, a period that completed the changeover from hand-craft to machine production, and through Europe's imperial ambitions, saw the reversal of East/West trading patterns. To chart all the fashionable fabric introductions and modifications during such a tumultuous period would require a lengthy dictionary. Rather than attempt a comprehensive survey, it is proposed to select a mere score of examples that either characterise a fashion period, or engage with the theme of empire. The analyses presented will serve to introduce methods and sources for studying fabrics that can be applied to other cases. They will also allow us to probe the notion of novelty alongside other cultural drivers for fashion materials. A wider aim is to address the gap highlighted by curator Lesley Miller (2007: 116): that "fashion historians have tended to concentrate on the cut and style of dress without giving due consideration to its material components."

Plains: actual and symbolic modernity

In plain weave, fabrics reach their greatest balance: "The artlessness of plain-weave cloth arises from a fundamental agreement between structure and appearance" (Ducrot 2008: 25). Unpatterned fabrics gain attention through subtle characteristics: reflectancy, opacity, texture and qualities of handle such as stiffness or suppleness. They are suited to understatement, to conveying ideas of purity and solidity, as well as for setting up a counterplay to supposed *vulgarity* in taste. Still, the plainest fabrics offered scope for fashion distinction. When Jane Austen ([1801] 1932: 266) commissioned her sister to purchase two dress lengths of brown cambric muslin for herself and their mother in 1801, she specified, "Buy two brown ones, if you please [...] but the kind of brown is left to your own choice, and I had rather they were different, as it will be always something to say, to dispute about which is the prettiest."

Plains form a necessary foil to patterned fabrics, avoiding the brashness of pattern on pattern. While plains dominate fashion, the attention of historians has focused on

patterned fabrics. This tendency is addressed here by highlighting instances where plains have demonstrated something new. Such was the case at the start of our period when the Swedish traveller Eric Svedenstierna ([1804] 1973: 174), visiting England in 1803, wrote of the "dazzling whiteness" given to cotton goods by artificial bleaching. Whiteness, being generally available for the first time, became such a prominent feature of fashion in the first decades of the nineteenth century that women were chided for resembling so many ghosts. Plains can also symbolise the new as with *gros de Suez*, the ribbed silk taken up after 1869 associating its straight channels with the technological feat of the new canal.[1] While connection with the canal was an afterthought, and the ribs were actually concerned with achieving a smoothness of form to suit the new fashion silhouette, both shared a sense of modernity.

Calico and nankeen: the naturalisation of cotton

European cotton fabrics rose to prominence in the 1780s after the development of machine spinning led to the ability to imitate and undercut cottons imported from India. Philipp Andreas Nemnich (1800 [2010]), who visited Manchester in 1799, summarised current developments in cottons. Mechanical spinning had given rise to three yarn types spun on different machines: *water twist* which was the strongest and reserved for warps (only available then as fine as 50 hanks per pound); *mule* yarn not so strongly twisted (from 40 to 200 hanks per pound and above); and *jenny* spun yarn, weak and suitable only for weft (spun in the coarser counts). These types were linked to procurement from different global sources of cotton fibre because each demanded certain qualities: water twist used cottons of middle degree from the West Indies and Brazil, while jenny yarns made use of the lower sorts from the Levant. The mule spun yarns required cotton of higher quality the finer the yarn that was desired, requiring the expensive Georgia and Bourbon types for yarns finer than 70 hanks per pound.

Combinations of cotton yarn spun on different machines created distinct fabrics. For calicos, water twist was used for the warp and jenny spun yarn for the weft. Nemnich ([1800] 2010) distinguished three grades: common yard-wide (actually twenty-seven inches), superfine yard-wide (a better grade costing two pence a yard more), and ell-wide (actually thirty-six inches) of the same quality as the superfines. For nankeens, he gives precise details: "Twist is used for the weft as well as the warp. The weft must be at least two numbers higher than the warp: for example, if the warp is No.32, the weft is No.34. All nankeens are dyed in the yarn [...] The ordinary buff or chamois colour of nankeens is [...] prepared from what is called iron liquor, oxide of iron dissolved in acid." Nankeens imitated the natural yellow cotton goods imported from China, and associated with Nankin [Nanjing] (Montgomery 1984: 308).

Thus, the mechanised spinning technologies gave rise to new cottons near the start of our period, although these fabrics were based on pre-existing Eastern types. Pride was taken in the modernity reflected by the technological achievement, placing cottons at the forefront of fashion. A contemporary commentator (Anon. 1810: 144) extols the new machines as "undoubtedly, the most wonderful productions of the human art [...] They enable the manufacturer to produce a better article than can be made by the hand, in consequence of the uniformity and certainty of their operations..." Valorising uniformity of surface points to a developing aesthetic of machine-made goods, which carried connotations of integrity, being *uncorrupted* by handling. Importantly, by the first decade of the nineteenth century, machine production allowed cotton to seem *naturalised*, to be viewed as a domestic product rather than an exotic luxury. And

freed from its orientalising associations, cotton was able to be worn next to the skin without giving rise to moral fears.

Lappet-weave muslins: from novelty to export

Muslin in general has been treated by Sonia Ashmore (2012), so it is proposed here to focus on a specialised production: lappet-weave patterned muslins. Lappet weaving employed a special patterning device to control the movement of extra warps (known as whip threads) held by needles spaced across the width of the loom in a frame, making them zig-zag to form small figures resembling those of the *jamdani* muslins of Dacca. Commercialisation of lappet muslins probably occurred in Scotland not long before 1800; in 1794, the Scottish Commissioners for Manufactures and Improvements (Commissioners: 4) advertised a premium for "Muslin, in imitation of the India Jamdannies, with regard to both the quality of the cloth and neatness of the pattern... the yarn to be spun in Britain." The grooved pattern wheel that controlled the movement of the lappet frame later became known as the *Scotch wheel*. In lappet muslins, the pattern warp travels from side-to-side in the figures but vertically between separate figures; the linking threads may be cropped away subsequently. Since the device that traces the grooves in the pattern wheel allows minor variations so that succeeding repeats of a motif have slight differences (Watson 1925: 297), the cropped lappet weave can resemble hand-embroidery.

By 1799, Gilchrist and Co. of Edinburgh advertised a range including "... Lappet Muslins, of the most elegant patterns ever exhibited in this country." Lappet-patterned muslins rose in consumption; George Hill, a London draper, advertised "200 dresses of coloured and white lappet muslins from 10s. to 21s. the full round dress" along with other British and Indian cottons in 1802. The British product competed with the Indian import in the second decade of the nineteenth century; in 1811, Foster and Co. of London advertised "39 Jamdannies, with every description of curious Articles from India, which are now much cheaper than ever." But by 1820, not only had lappet muslins passed their peak in European fashion, they had begun to be exported to India. A shipment book holding counterpart samples of lappet muslins that sailed for Bombay in May 1822 gives an idea of the appearance of such fabrics in the early nineteenth century.[2] It is difficult to know whether fashion interest in lappet muslins arose because of the ingenuity of the invention, or from the cheaper replication of an expensive hand-patterned Eastern original. However, their advertisement as *lappets*, rather than as *jamdanis*, signals that their novelty as home-produced goods was part of their appeal.

Unusually, lappet muslins are a case of machine production that does not produce uniformity, and this may have been to their detriment in Western fashion. Lappet-weave muslins found a market in South America by the mid-nineteenth century, and later they were introduced to the Arab market where they found favour for the men's headscarf known as *keddiyeh*. This fashion aftermath represents a typical pathway for European fabrics during our period, that of pursuing sales in one or more of the expanding foreign markets supported by European imperialism.

Valentia, gambroon, delaine and alpaca: mixing traditions

Isabella Ducrot (2008: 26) sees in the warp and weft of weaving a marriage of masculine and feminine elements, an idea expressed as far back as Plato's *Laws* in which the firmness of the warp is seen as male and the adaptability of the weft as

female. Master weaver Peter Collingwood retained the impression of animated roles for the woven elements, but perceptively feminised the warp as *pregnant* with possibilities for various offspring (Theophilus 1998: 11). The concept of mixture fabrics arises from this basic nature of weaving as an interchange of contrasting elements. A mixture fabric uses pure yarns of one fibre type (or different yarns plied together) so as to retain the properties of each fibre, as opposed to blended fibres that result in a more uniform response. One early line of development in mixture fabrics was stimulated by Islamic culture where men were proscribed from wearing pure silk fabrics. This gave rise, for example, to *mashru*, a satin-weave mixture of cotton and silk that maximises the visual effect of silk on the surface where long silk warp floats occur, but places the cotton next to the skin, where the silk only appears as single binding points. In Britain, *bombazine*, a mixture of silk and worsted with matte appearance, was used for mourning dress, and this cultural association may have delayed experimentation with mixture fabrics until stimulated by the rise of cotton in fashion.

Britain's damp climate was inimical to the prominence of cotton fashions during the first decades of our period, and would naturally have spawned thoughts of mixing wool with cotton to lend body and warmth to fabrics. The development of lightweight mixture fabrics of cotton along with silk or worsted wool received much attention from British manufacturers from the 1810s to the 1840s. Valencias were an early example; silk-striped valencias for waistcoats are noted by *Ackermann's Repository* in 1809 (186), and were advertised for waistcoatings by a merchant tailor travelling from London to the worsted weaving centre, Norwich, in 1813 (Cusack: 1). The order book of the wool printer Henry Cooke of White Conduit Fields details a rising demand for printed valencias from 1821.[3] Cooke's valencias were probably produced in Yorkshire given his numerous contacts in that county. His samples show white cotton warp and cream worsted weft mixtures, occasionally highlighted with narrow silk stripes; the fabrics play with the contrast between matte and bright lustre aided by a texture of thick and thin warps.

Another worsted mixture cloth, gambroon, appears to have been initiated by the London draper George Fox. Employing mohair in its composition, Fox claimed it as a "patent" rain resistant cloth as early as 1812.[4] In 1823, Fox advertised, "To prevent imposition by any description of persons whatever offering or selling worsted Valencias for the real Mohair Gambroons, they are stamped on the back– 'Fox's Patent Gambroons'..." The *Gentleman's Magazine of Fashions* for June 1828 described a "Riding Frock Coat [...] made of superfine patent gambroon" worn with a "waistcoat of light fawn chequered Valencia," while in September 1831, it featured a "Shooting Dress [...] of twilled gambroon" with matching waistcoat. Such references indicate that gambroon enjoyed favour for masculine outdoor wear, especially for the summer season. However, the fabric was not considered suitable for indoors. In the 1830s, an artist wishing to travel light purchased "a knapsack [and] a suit of gambroon" for his journey up the Rhine but notes his discomfiture at wearing the suit in a hotel, something he would not even have considered doing in London (Anon. 1836: 2).

Fox's persistent marketing earned the fabric a sneering reference in *The New Monthly Magazine* where it was associated with other much-touted wonders: "'patent percussion guns,' [...] 'pedometers for the waistcoat jacket,' [...] 'gambroon shooting-

jackets of an entirely new cut,' and 'waterproof hats on a new principle'..." (Swanquill 1833: 54). This suggests a fall in status. Fox continued to market mohair gambroons emphasising their utilitarian qualities: "dust and dirt will not adhere to them; they do not spot or cockle with the wet and will turn more rain than cloth" (in Stephens 1839: n.p.). A blatant appeal to functional qualities may have been acceptable to men under the banner of new technical invention, but fashion normally shuns practicality. Since the fabric filled a genuine need for lightweight outdoor wear, it became more widely manufactured from 1834. In fact, John James (1968 [1857]: 445) described it as *entering* the market at this date, constructed from a warp of "separate threads of cotton and worsted twisted together" and a cotton weft. Possibly, its "re-launch" emphasised the pleasing, subdued colouration, rather than utility. The gambroons registered by Ibotson & John Walker, Buckley Brothers, and Frederick Harrison under the 1839 Design Copyright Act[5] show variations of plying together white cotton and brown worsted. A trials book from the Swaisland archive holds printed gambroons dated 1838 to 1839;[6] these are trouserings plate-printed with indeterminate mottled patterns, emphasising the importance of the speckled colouration. Despite such attractions, the fashion exit of gambroons is signalled by their offer as a low-priced export cloth for southern Europe and South America. Their banishment was complete by 1854 when a journalist touring a Manchester warehouse claimed to have heard *for the first time* of waistcoatings called valentias and gambroons (Dickens: 270).

The premier British mixture fabric of the mid-nineteenth century was the delaine. This term is not simply a shortened name for the French *mousseline de laine* that was introduced around 1830, but rather an adaptation of the French luxury wool product to a lower-priced mixture of cotton warp and worsted weft. This version combined the cotton technology of Lancashire and the worsted expertise of Yorkshire to imitate the softness and drape of the French original. The challenge to dyeing posed by the combination of vegetable and animal fibres was solved by the 1840s with steam-fixed colours. Dyes were applied by hand-block printing to achieve the depth of shade desired in this decade of rich colouring, with the attendant labour cost of hand work. John Mercer's development of chlorination of wool around 1842 improved receptivity to dyes enabling the machine printing of delaines (Lightfoot 1926), bringing them within reach of a much wider public. Nevertheless, machine printing entailed patterns with smaller repeat units and simpler motifs. The fashionable patterns of the mid-1840s set by the Paris elite were large and bold, accompanied by a revival of hand-blocked *rainbow* grounds. These appear calculated to assert the primacy of the hand-processed luxury cloth over its roller-printed imitation. Thus, for a short time, the elite sacrificed their usual claim to understatement in dress in order to maintain fashion supremacy when faced with the levelling effect of new technology.

In 1836, the textile entrepreneur Titus Salt took a chance on some bales of animal hair lying in a Liverpool warehouse. Charles Dickens (1852: 253) transformed the incident into legend, portraying the Yorkshireman as a figure of ingenuity able to see beyond the "dirty bales of frowsy South American stuff" to a new fabric enterprise. Salt was not the first in England to use alpaca (Walton 1841: 39), but probably the first to develop it as a cloth in its own right. Many trials were necessary before the alpaca could be worked successfully on wool machinery, and the initial results were rather coarse and unappealing. It was in combination with other fibres that alpaca first found favour, and its qualities of lustre and lightness coupled with durability and moth-

resistance, added value. Worked with silk warps, it formed a substitute for pure silk, and with cotton, a mixture adapted to multiple uses: "ladies dresses and children's frocks of light summer make [...] waistcoating as cool as any cotton, yet rich and lustrous as the best silk patterns." (Dickens 1852: 252) Commercially introduced around 1841, the reputation of alpaca grew in the 1850s and 60s. A ladies' magazine (Anon. 1869: 136) boasted of the reversal of the usual direction of fashion emulation: a "French lady coming to England always takes back with her so many yards of the coveted alpaca cut into dress lengths."

Popularity led to adulteration of genuine alpaca with over-large proportions of long-wool fleece by unscrupulous manufacturers (H.B. 1881: 209-10); such imitation alpacas puckered with rain-wetting, thus lacking the suitability for walking dresses that endeared the fabric to British consumers. Insisting on undyed shades ensured high quality, which was then reconstrued as refinement: "it must be always black, grey, white or buff, any other colours are not according to good taste." (Anon. 1869: 136) Thus alpaca iterates several aspects noted with other materials: the "naturalisation" of a foreign material through enterprise and technology, a passion for smoothness, and a desire for lightness of weight. But we also see the linking of pure, unmixed fabric with concepts of refinement.

Checked and striped silks: the other half

The jacquard attachment for weaving, commercially introduced around 1804 in France, was to transform weaving from craft to industry during our period. Adoption was gradual; as Natalie Rothstein (1977) has shown, in England the jacquard was not significantly taken up until the 1830s. The influence of the jacquard mechanism on design of figured fabrics has been treated in several books on silk (Anquetil 1996; Buss 1997; Musée Carnavalet 2002; Schoeser 2007). Therefore, we will trace here the more overlooked checked and striped silks. Dresses in these *lesser* silks have not been preserved in the quantities of the more elaborate jacquards, but survival of the pattern archive of the Lancashire firm Hilton and Son enables the mapping of significant design features across a twenty-five-year period from the late 1840s to early 1870s.

The most distinctive introductions can be cited. Shaded warps are first seen in 1851; finely barred grounds with wefts alternating in groups of four black and four colour were introduced in 1853 and phased out after 1855. The seasons from 1857 to 1858 saw a vogue for simple square checks, followed in 1858 to 1859 by broad cross-wise banded effects. The years 1859 to 1860 witnessed a return to finely barred grounds, but this time with alternations of two wefts each. In 1861, a spaced bar effect with bright yellow highlights beneath the bars commenced. Fashions for 1863 returned to softer effects and smoother textures, and 1864 saw the introduction of the *gros* texture, a fine corded effect. In 1866, broad stripes came into fashion, especially paired and triplet stripes, while the late 1860s brought calendered glacé silks to the forefront. Such changes reveal that checked and striped silks, far from being staple goods, had recognisable fashions often lasting no more than two or three seasons.

In Britain, these simpler silks were a Lancashire speciality, with Spitalfields undertaking most of the complex silk patterns. It cannot be chance that after the Anglo-French free trade agreement of 1860, when the English silk industry was put in jeopardy, that Victoria and Albert were photographed with the Queen wearing a chequered flounce silk and the Prince sporting a checked waistcoat with predominant

warp stripes, both types woven in Lancashire. The royal couple expressed solidarity with the home industry at a time of difficulty by avoiding wearing anything of French influence. The silk industry had often been supported by elite patronage, but this is a rare instance of patronising a lesser mode. The association of French fabrics with extravagance and frivolity in comparison with the sobriety of national taste was a paradigm later invoked in Britain and other countries in order to curb consumer preference at a time when Paris dominated women's fashions.

Blue prints and purple prints: fossilisation of fashion

Although the print trade largely depended on seasonally changing patterns, the cheapest prints for the working classes were a staple commodity. An "Old Draper" (1876: 102) recalled retailing in the early nineteenth century when "The common people and servant girls generally wore [...] navy-blue prints, with a small white or yellow spot ..." A step above was the wash-fast, madder-dyed article which was introduced as day wear for the middle classes. Thomas Hoyle and Sons produced a madder purple "superior in brilliancy, fastness and utility for domestic wear" (Potter 1852: 3) that became the by-word for this style in England. A Hoyle pattern incorporating touches of red shown in the *Journal of Design* as "a slight departure from the ordinary style of the Mayfield Works" (1849: 108) evidences an attempt to retain a sense of fashion change for purple prints. But calico printer Edmund Potter (1852: 51) linked purple prints with "The sober careful classes of society [who] cling to an inoffensive taste, which will not look obsolete and extravagant after the lapse of such a time as would render a garment comparatively tasteless and unfashionable in a higher class." By the middle of the century, purple prints had dropped in status, superseding indigo blue prints for servants' dress, with similar but less practical light pink and pale blue styles the choice for middle class day wear. In the 1880s, even servants began to eschew the purple print. A writer favouring modernisation in servants' behaviour, begins her support by evoking empathy: "How should we like [to return to] the old-fashioned purple print gowns of bygone days..." (Anon. 1883: 6) In the 1890s, purple prints became a signifier of the elderly and "grandmother's days." Nevertheless, this trajectory is a British one; in America, purple prints had a longer run in fashion. Joan Severa (1995:204) cites "the neat & varied designs of Hoyle's prints" recommended for second mourning in *Godey's Lady's Book*, March 1861. And on the Continent indigo resist prints remained in use, entering into folk dress revival. Missionaries brought the style to South Africa by the mid-nineteenth century where indigo prints were known as *shweshwe*, and are still used for skirts, aprons and head wraps.

Printed shirtings: concealing masculine frivolity

A caricature of 1846 in the *Allgemeine Theaterzeitung* shows men relaxing at a bathing place in shirts printed with loud motifs; below, washerwomen hang the figured shirts on a line, while the caption asks, "Why shouldn't shirts also have their fashions?" (Rasche and Wolter 2003: 308). By gaining the attention of the caricaturist, it would appear that such shirts were a novelty. A history of Alsatian textile printing based on original documents states that Dollfus-Meig and Frères Koechlin began printing *chemises à sujets* in 1847, indicating that such shirtings had moved into mainstream fashion (Société Industrielle de Mulhouse 1902: 399). The mode seems to have transferred from prior waistcoat styles, with waistcoats becoming increasingly sober, and the motifs moving a layer inward. Sporting and animal motifs, many sourced from works by Henry Thomas Alken or Edwin Henry Landseer, were

frequently chosen as themes. It was as if the leisure interests that men wished to express had to be hidden, only to be revealed on relaxed occasions when shirtsleeves could be shown: an embodiment of Flugel's concept of the "Great Masculine Renunciation" (Bourke 1996).

During the 1870s, the motifs chosen for shirtings were reoriented from sports to humour, and at the start of the next decade, the genre seems to have transferred from menswear to the dress of women and children with increasingly playful motifs. At the same time, figurative printed motifs began to be used as linings for men's clothing, concealing this aspect of men's expression one layer deeper. Perhaps only amongst close associates would a man reveal the lining of his necktie with an image of a popular actress or politician. We can trace in this progression an attitude toward materials used for outward and inward dress. In Western culture, truth is an inner quality; that which is hidden from view represents the inner self. For centuries, this was symbolised by pure white linen worn next to the skin, but during the third quarter of the nineteenth century a change occurred. Not only was cotton exchanged for linen, but undergarments began to be shaped to the body, and embellishments added. Men's printed shirtings can be seen as the first decorated undergarments.

Moiré antique: return to nature

The finishing technique of moiré or watering originated long before our period. Samuel Pepys "bought some greene watered Moyre for a morning wastcoate" in 1660 (Latham and Matthews 1970: 298 (21 Nov)). In the mid-nineteenth century, new techniques coupled with the crinoline fashion stimulated a revival of the fabric. Moiré requires as its basis a weft-ribbed fabric. In the moiré antique process, the fabric is folded in half selvage-to-selvage so that the ribs lie nearly parallel, but due to slight variations in the weave, the ribs cross in places. The deviation of the ribs is normally heightened by running the hand or wooden forms over the folded fabric. When the prepared fabric is afterward pressed under heavy weight, this causes localised displacement and flattening at the intersections of the ribs. On opening the fold, the crushed portions of the ribs reflect light, showing as bright wavering lines or *filets* on a dark ground; and the pattern is symmetrical on opposite halves of the cloth. Thus moiré antique is a material-and-process-based ornament. James Trilling (2001: 203) saw this class of ornament as the distinctive idiom of modernist design; so ironically, *moiré antique* may be viewed as the most modern fabric of our period.

Thomas Seamer, a Cheapside mercer, showed *moiré antique* in the British silks section of the Great Exhibition, and by 1853, it was advertised for both dresses and waistcoats. Newspaper advertisements suggest the fashion for moiré antique reached its height between 1858 and 1866 when the fabric could be displayed to advantage on the wide crinoline frame. The British seem to have led the trend, possibly because of technical advances in calendering. A report of 1861 (Otway: 192) claims it was once "a manufacture which was almost exclusively English, and brought by them to great perfection" but that Lyon silk finishers had since advanced the technique so as to be competitive in both beauty and price.

Its stiffness, weight and great expense made moiré antique appropriate for special occasions, equal to velvets and the heavier satins. Like these, it held an air of gravity and symbolised wealth. In white, it became the bridal wear of aspiration. In a novel of 1859, "the bride, being a widow [...] could [not] adopt the *regulation* costume of a

white moiré antique gown and a lace veil" (Eden: 153). Likewise in 1862, we read of a wedding toast given to the bride's maids, hoping that "before long pink tarlatanes might be exchanged for white moire antique and myrtle wreaths bud into orange blossoms..." (Carey: 81). Moiré antique was a fabric to wear for a portrait, whether painted or photographic; Florence Nightingale chose moiré antique for a photograph of 1854 (Lambert 1991: 47). The central crease that demonstrates the symmetry of the true *à l'antique* type is visible in the picture, and its broad filets indicate a moiré of the highest calibre. Unlike mechanised production, the ethereal forms of moiré arise between the touch of the craftsman and the imperfections of the fabric, only partially controlled. Moiré seems to reflect the spiritual side of mid-century Victorian society; at a time of awakening anxieties about the destructiveness of industrial growth and renewed interest in nature.

From crape to crêpe: changing surface values

Silk crapes were a speciality of Bologna, widely recorded in use since the sixteenth century for mourning accessories and by religious orders. From the seventeenth century, crapes were imitated in France, and the production came to England with the Huguenot refugees. The Bolognese product remained the most admired, and efforts to gain the secrets of the industry were still being foiled in the eighteenth century (Giusberti 2006). The story of crape in our period begins with the industrialisation of the product. The Courtauld family began crape weaving in 1827, using power looms from 1832 (Taylor 1983:216-7). Courtaulds began at an opportune moment as the use of mourning crape was to escalate as middle class women took up mourning dress, mourning periods grew longer, and mourning wear became based on fashionable clothing styles (which entailed increasing amounts of trimming), while mourning crape had the advantage of immunity from changing colours. Courtaulds success was based on a finishing process that mechanically imitated the crimp of traditional crape. This was achieved by an embossing process followed by releasing the natural crimp arising from untwisting of the over-twisted weft yarns (Taylor 1983: 217-19). However, in the 1880s the use of mourning crape began to decline, and lost royal patronage after the death of Queen Victoria; overseas and empire markets were relied upon to boost sales until the 1930s.

Courtaulds was able to apply its knowledge of spinning and weaving crêpe yarns to production of *crêpe de chine*. Crêpe weave silks had been available as Chinese imports, sometimes used for shawls or bonnet trimmings, but the fashion for *crêpe de chine* dresses appears to have begun in 1870, probably alongside the growing European fascination with the Japonesque. *The Milliner* for June of that year reported: "Costumes of poult de soie and crepe de Chine are in vogue in London [...] true elegance seeks the quiet effects produced by different tissues of the same colour." (quoted in Anon. 1870:4) By December, it was claimed, "Crepe de Chine is the *ne plus ultra* material for evening wear, but it requires a very well filled purse to afford the luxury..." (Journal des Modes 1870: 3). *The Queen* reported in May 1872, "A good many dresses of *crêpe de Chine* are seen at evening parties, apricot, pale and bright green, coral colour, and salmon colour, but it is seldom that the entire dress is composed of *crêpe de Chine*, which is rather too soft and clinging when used alone. It generally combined with silk or tulle, and less often with satin." (quoted in Anon. 1872: 7) Courtaulds began production of *crêpe de chine* in 1896 (Coleman 1969) when soft draping fabrics had become more widely adopted. In the move from crape to *crêpe*, we see the valorisation of a matte surface quality over the desire for sheen.

The dullness once associated with mourning was remodelled as an aesthetic taste. Glossiness was later to become associated with flashiness and pretension.

Khaki drill: the new invisibility

G.W. Armitage ascribes the origins of khaki drill to a conversation in India between an English army colonel and a Swiss traveller, John Leemann. The colonel observed that a fabric was required for the troops that would not shrink, show dust or fade. Leemann put the problem to the chemist, Frederick Albert Gatty, whose subsequent experiments led to an extremely fast dye based on iron oxide that was patented in 1884. The men found E. Spinner & Co. willing to take on their project to produce the dye, hence "the brand of Leemann & Gatty Fast Khaki Dye began" (Armitage 1938: 91-93). Armitage's own firm, Armitage & Rigby, having declined the dyeing, nevertheless offered to weave the cloth, and the first pieces of khaki drill ever made were woven at their Rodney Street Mill in Warrington. The original khaki dye was not fast to acid, which prompted further investigation leading to an after-treatment in silicate of soda, patented in 1897. This elevated khaki to "a degree of fastness, hitherto unattainable by any natural or artificial true dyestuff..." (Theis 1903: 5).

In that year, khaki was issued to all British regiments being posted abroad, and it had its first major trial in the Boer War. The First World War brought a great escalation in production of khaki drill which was to embed it in collective memory. Jane Tynan (2013) has shown how khaki came to embody the new approaches to warfare, with the concepts of camouflage and functionality replacing the old idea of fearsome spectacle. Khaki became a metonym for the soldier, widely adopted in everyday language and literature, and came to represent new ideas about the citizen soldier. Regretting the passing of scarlet and brass, a wartime journalist saw "the now familiar khaki suggest[ive of] cold duty, drills, drab routine and the prosaic side of war, shorn of its romance."(Cowper 1915: 23) With its visual levelling, and evocation of earth, khaki drill served to make our memories of the Great War those of the experience of the common soldier.

Gabardine: crossing the gender divide

Thomas Burberry patented gabardine in 1888, described as a layered construction: an outer shell of twilled or plain linen, and lining of waterproofed cloth (Burberry: [1888] 1896: 266). The crucial innovation, not clear from the patent, seems to have been that of using Egyptian cotton treated for water resistance in the yarn before weaving (Cunnington 1937: 431). Not until a further patent of 1897, along with Frederick Daniel Unwin, did Burberry specify a weave structure called drabbet: a twilled cloth usually made from unbleached linen. The patented improvement in "manufacture of drabbet cloth for gabardine fabrics" implies that from that time, gabardine referred to the combination of cloth and waterproofing (Burberry and Unwin [1897] 1903: 9). The patent states that gabardine is made from pure linen, or a linen and cotton mixture, and depicts the combination twill weave used to produce the characteristic closely-packed steep twill of gabardine: alternate wefts weave 4/2 twill and 3/3 twill. Adding to the complexity, the twill is sometimes broken, and some shots are repeated. Later constructions retain the steep combination twill, but regularise the weave.

From the start, the lightness of gabardine– on top of being windproof, waterproof, and thorn-proof– made it a fabric suited to sportswear for both sexes. Already in 1889,

The Cornishman (Anon.: 4) noted a father who encouraged his daughters to accompany him to shoot in winter: "Instead of a lounge in an armchair and a trashy novel this *pater familias* says, in effect:– Put up cloth knickerbocker breeches (ladies') strong boots, tidy leathern gaiters, a skirt of Burberry's gabardine, and a jacket [...] and shoot and grow hardy..." Cunnington (1937: 426) signals the revolutionary importance of sports clothing for women: "an attire designed ad hoc in which the [...] effect on the male was scarcely considered." While the Cornish father was not concerned with the allure of the material, the article emphasised that the health benefit would fit the girls for their roles as mothers-to-be, thus neutralising any potential radicalism.

But outdoor activity for women was a growing aspect of leisure, and by the early 1900s, Burberry's took advantage of the opportunity for marketing gabardine to ladies: "Now that they spend so much time in the open-air, and claim full share of what were once considered solely male prerogatives, far more attention is given to attire as a means for [...] affording the fullest opportunity for the exercise of physical energy and skill" (Burberrys [1910]: 5). The company offered gabardine in five weights: "Tropical, Airylight, Summer, Autumn and Winter" advising that "The first three, being lighter, are those usually required by women." (Burberrys [1910]: 13) Hence, we have the same material worn by men and women, but gendered through the factor of lightness of weight. The rise of Burberry's gabardine to an iconic fabric of the twentieth century may relate in part to this ability to cross gender by combining technical inventiveness with marketing skill.

Shirtings and dresses: the discipline of stripes

In the early nineteenth century, striped dress materials were rendered more widely available by improvements in engraved cylinder printing. In woven stripes, the setting is determined by the colour sequence of the warps and cannot be changed without remounting the loom. Roller printing allowed striped fabrics to be made and varied with ease for the first time. A pattern book of 1806 to 1808, from the prominent Manchester engravers Joseph Lockett & Son, shows that stripes were in steady demand.[7] Known as *bengals*, striped rollers were charged by the number of lines per inch– which could be up to fifty. During his years in Manchester, the enterprising German businessman Nathan Rothschild purchased heavily in roller printed stripes and checks to be sold on the Hamburg market.[8] Thus, it could be said that such cottons laid the foundation for a banking empire of the nineteenth century.

Stripe and check designers formed a rank of their own, with entire careers spent in the discipline of fine discrimination amongst abstract linear forms. There are two main aspects to designing stripes: the proportion of the stripes, which determines the coverage of the ground, and their colouring. Conventions for coverage probably developed alongside the gendering of cloth during the latter half of our period. By the early 1900s, white-ground men's shirtings were based on fifteen to twenty-five percent colour: fifteen percent for medium-weight materials, twenty percent for Oxfords, and more for zephyrs. Men's shirtings had above all to be clean-looking, with emphasis on whiteness. Women's dress goods required upwards of twenty-five percent colour, aiming at distinctiveness, delicacy of colouring, and a light appearance (Milnrow 1925: 296). The goal in both cases was one of visual balance in which neither stripe nor ground strikes the eye first. While obeying the rules, stripes could still vary in character from subdued to sharply-defined giving a range of possibilities

to suit the personality of the wearer. While conformity to dress codes was observed in the large, the desire for personal expression could be afforded by the small.

Flannelette: volatile fashions

The light cotton dress materials that were worn throughout our period were extraordinarily perilous in Western homes where fires were used for heating during the winter months. Untreated cotton is highly flammable, igniting from a single spark and propagating flame unless extinguished or suffocated. The risks were well known in the eighteenth century when cotton was mainly confined to accessories such as sleeve ruffles or aprons[9], but became much greater when whole garments were composed of cotton, and were further heightened by the introduction of the cage crinoline. Unsupervised children were especially vulnerable. "Another death from burning" is frequently reported in newspapers through the mid-nineteenth century alongside warnings: "As the winter is coming on– a season in which a week scarcely occurs that we have not the melancholy task of recording the deaths of two or three children from fire [...] we would strongly urge upon parents, among the labouring classes especially, to clothe their children in woollen dresses..." (Anon. 1842: 3). Chemical rinses were recommended to give flame retardant properties, with alum and borax probably the most effective, but these chemicals dusted off in wear, and had to be renewed with each wash. The flammability problem rose to a head again in the 1890s with the proliferation of flannelette nightwear. Flannelette is a raised cotton calico, and the fine, downy nap is especially susceptible to flame which flashes over the surface. The loosely-woven, and cheaper varieties bought by the working classes were even more easily ignited. It wasn't until 1912 that a commercially-viable fireproofing treatment able to withstand washing was discovered (Perkin's stannic oxide process), and supplies of non-inflammable flannelette were available from Whipp Brothers & Tod of Manchester (Perkin 1912). In 1913, the Fabrics Misdescription Act began to provide the British consumer with protection from unscrupulous merchants selling fugitive fire-proofed flannelettes as permanent. So we find in the final years of our period a transition to the contemporary attitude toward fabric safety– one of legislation and regulation.

Rubber and whalebone: moulded by unsustainability

The long nineteenth century saw the expansion or transformation of several manufactures employing non-textile materials: straw for millinery, jet for jewellery, and steel for corsetry. One of the few truly new introductions was rubber: a material sourced from imperial plantations. Nancy Rexford (2000) has outlined the introduction of rubber for waterproof garments, shoes and elastic webbing; and the rainwear industry has been treated by Sarah Levitt (1986). But it is worth drawing attention to rubber as an early instance of a material not expected to last the lifespan of the garment. A trademark stamp of 1885 used on rubber goring for shoes by a Boston firm included "a date mark of the month it was made, stamped on the white back of the goring [...] included because it was advertised to wear eighteen months after it was made..." (Rexford 2000: 285). This seems to signal a significant change in attitude; clothes were no longer something expected to outlive the wearer.

Another change of outlook is signified by the alarm about the threat to animals hunted in the name of fashion. Robin Doughty (1975) has thoroughly covered the topic of feather fashions and the rise of bird protection societies. Curiously, whales did not arouse similar feelings. Although whales were sought mainly for their oil and

spermaceti, whalebone for fashion use was more than a mere by-product, and provided the reason for fishing particular species. The right whale (Balena mysticetus) found near Greenland yielded whalebone of the finest quality, black and highly elastic (Flower and Lydekker 1891: 237). By the mid-1850s, overfishing meant that whalebone was in short supply just when it was wanted for cage crinoline manufacture, leading to prices nearly doubling (Anon. 1857: 254). In 1866, it was recognised that "for more than two centuries [...] ceaseless warfare, carried on chiefly by the English, Dutch, and Danish whalers [...] brought the species to the verge of extinction" (Anon.: 176). Low stocks led whalers to pursue the common rorqual (Balenoptera musculus) in the southern oceans although its whalebone was of inferior quality, of slate-colour variegated with yellow or brown. Crinoline makers made use of this lesser quality by braiding strips together into lengthy bands; the black braiding thread hiding the colour variation. Unlike the hunting of birds, the destructiveness of whale fishing did not enter public consciousness. The song bird was part of childhood lessons in virtue, but whales were remote from daily life.

The Romantic era viewed nature as a gift of Providence for the use of humankind. Priscilla Wakefield (1800: 4-7) explains: "We may admire the goodness of Providence, who leaves not the most obscure corner of the globe without its peculiar riches..." further expounding, "Providence has wisely endued mankind with as great a variety of inclinations and pursuits, as there is diversity in their persons; some shew a very early inclination for a sea-life that no danger can deter [...] which appears to be implanted for the purpose of providing the means of an intercourse between the inhabitants of distant countries, by which each party may reap advantage by interchanging the superfluous produce of distant climes..." Wakefield (1800:4-7) thus justifies at once the exploitation of natural resources and imperial trade.

Conclusions

We began by positing novelty as a major driver of change for fashion materials during the long nineteenth century. Certainly, manufacturers producing patterned goods felt the relentless drive for novelty: "Every calico-printer must have the means of producing a constant succession of new patterns […] although millions of patterns have preceded those of any particular year, yet the patterns each year must be stamped with the characteristic of novelty, or they will not sell." Novelties by definition have a brief life span and novel fabrics can only survive if they are refreshed by new variations. Checked silks were updated by seasonal changes over a lengthy period, but novel designs were not sufficient to sustain the fashionability of purple prints. As novelty wore off in the home market, goods often found new markets in the empire. Such was the case with purple prints, and the indigo prints that preceded them; and we have also seen this strategy employed with lappet muslins, gambroons and mourning crapes.

Dress materials served to embody values of the age. In the new calicos, nankeens, and mixture fabrics, we find not only the embracing of machine production, but the ability of machines to transform and even domesticate a foreign staple. Here, the *new* represented a modernity which believed in progress, and in the commercial underpinnings of imperial power. Mechanical production and finishing processes brought a new uniformity to the surface of cloth, a flawlessness unknown previously, and the increasing uniformity of surface was endowed with ideologies of virtue. This could act counter to mixture fabrics; for a time pure, undyed alpaca was the ultimate

in refinement– its flawless, smooth surface projecting sobriety and understated wealth.

The materials of fashionable dress can be dangerous, in different ways, to those who procure them, those who make them and those who wear them. The adoption of cotton dresses in an era of open fires and candlelight may seem a preposterous choice. But the risks undertaken for such fashions serve to underline the depth of the underlying values that support them. As the century progressed, there appears to have been a shift in belief: that safety was not simply a personal matter, but it was the collective responsibility of manufacturers to solve dilemmas within their domain. As to the animals whose lives were endangered by fashion, there was an awakening consciousness brought about by the excesses in feather fashions toward the end of our period that represented a shift from belief in a providential nature to a nature that must be cared for.

The oscillation between class distinction and levelling through fabrics provided a creative tension throughout our period. Delaines saw a move to loud hand-blocked patterns in the mid-1840s to counter the new machine printed versions. Practicalities were welcomed by fashion when new, but later shunned. With khaki drill, a textile finally marks a shift in class values, finding nobility in the common soldier, who partakes of the colour of the earth, and was sadly often returned to it.

The gendering of textiles has been observed throughout our period. Printed shirtings formed a case where designs were re-gendered to exert a continued demand. In stripes we saw a rigid gender code that ascribed colour and delicacy to women, and cleanly appearance to men. The creation of gabardine not only allowed women to enjoy outdoor leisure pursuits once limited to men, but saw lightness of weight as the final delimiter of the gender divide.

Finally, the anxieties of the age show in the tensions between extravagance and sobriety played out in an ambivalence toward bright and matte lustres seen in mixture fabrics and crêpes. Anxiety about modernity was also found in the espousal of the natural patterning of moiré antique. Isabella Ducrot (2008: 26) compares the interacting forces present in woven cloth to the rhythmic alteration of breathing, "systoles and diastoles, contractions and distensions," a metaphor for life itself. Textiles embody the aspirations and struggles of people during the long nineteenth century, marking imperial ambitions, a belief in progress, class and gender distinctions, and a drive for change fed by new anxieties as well as novelty.

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[1] Wigan Heritage Service, Charles Hilton & Son archive: B78.530 and B78.541.
[2] Manchester Archives: Calico Printers' Association: M75/ Design Dept. 3.
[3] G.P. & J. Baker Archives: Inv.096 Order book 1821-23.
[4] No record of an actual patent has been found.
[5] National Archives. Buckley: BT42/3. Ibotson and Walker: BT42/1- BT42/4. Harrison: BT42/1.
[6] G.P. & J. Baker Archives: Inv.077: Swaisland *Gambroons 1838-9*.
[7] Victoria and Albert Museum: Furniture, Textiles and Dress. Joseph Lockett engraving book, 1806-08.
[8] Rothschild Archive. 1/218/45. "Manchester Stock Price & Printing Book 1802/1807."
[9] For example, in January 1767, Lady Mary Coke recalls Lady Suffolk setting her ruffle on fire "which immediately blazed up her arm..." (Home: [1889] 1970: 107).

Figures

1. Photomicrograph (65x magnification) of the reverse of a block-printed calico gown, 1780s. This shows the typical calico construction of smooth warps, twisted on the water frame in the Z direction; and spongier wefts spun on the jenny in the S direction. *Royal Ontario Museum*.

2. Detail of a page from a warehouseman's counterpart book showing samples of lappet muslins exported to Bombay in 1822. *Manchester Archives courtesy of Coats plc.*

3. Detail of a printed valencia from Henry Cooke's order book of 1821 showing cotton warp and worsted weft. *Courtesy of G.P & J. Baker.*

4. Gambroon registered by Frederick Harrison in 1840, showing variegated colour produced by plying together cotton and worsted yarns in alternate wefts. *National Archives BT42/1*.

5. Page from a pattern book showing machine-printed delaines, 1846, possibly from Broad Oak print works. Roller-printed delaines were made possible by Mercer's wool chlorination process. *Author's collection*.

5a. Fashion plate reflecting French styles for large-scale block printed delaines. From: *The New Monthly Belle Assemblée*, 23 (Jul) 1845.

6. Queen Victoria and Prince Albert wearing Lancashire silks, *carte-de-visite* photograph by John J.E. Mayall, February 1861. *National Portrait Gallery.*

6a. Detail of a painted flounce design and corresponding woven silk of autumn 1860, Charles Hilton pattern books. *Wigan Heritage Service.*

7. Hoyle's purple print from an album assembled in Manchester in the 1840s. *Downing Collection at MMU*.

7a. Purple print by Thomas Hoyle and Sons, from the *Journal of Design and Manufactures*, 2 (Nov), 1849, p.108. *Author's collection.*

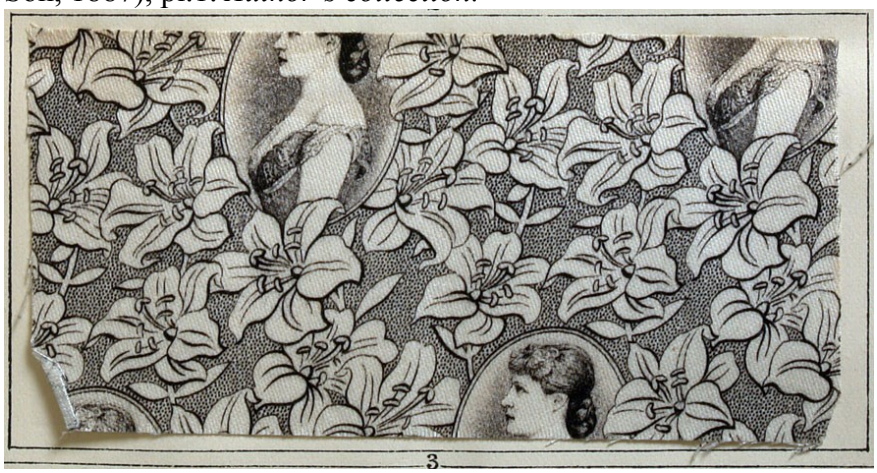
Selected Patterns for Dress.

CALICO, PRINTED BY THOMAS HOYLE AND SONS.

This graceful design, with its tiny red dots, is a slight departure from the ordinary style of the Mayfield works. We are apt to associate the Hoyle purple with the humbler class of wearers, but the present pattern is such a successful union of quiet grace and liveliness, that it might, we think, be worn by all or any who are not too grand to use a calico print. A ribbon of bright light blue, amber, or cherry colour, at the wearer's neck, would be an harmonious combination.

8. Page from a colourist's notebook showing printed shirtings with sporting motifs, Charles Swaisland, Crayford, 1850s. *Downing Collection at MMU*.

9. Lining print featuring the actress Lily Langtrey, by James Hardcastle & Co. From: Antonio Sansone. *The Printing of Cotton Fabrics* (Manchester: Abel Heywood & Son, 1887), pl.1. *Author's collection.*



10. Mary Constance Wyndham (Lady Elcho) wearing a dress probably of silk crêpe and satin, in a setting of Japanese objects. Watercolour by Edward John Poynter, exhibited 1886. Private Collection.

11. Burberrys gabardine, around 1910, from "Burberrys for Women". *Manchester Art Galleries*.

12. Dacca Mills flannelette, from Rylands & Sons Ltd., Manchester price list 1923, p.40. *MMU Library*.