Reconsidering the forgotten 'shoddy' industry and concepts of authenticity through 3D printed, repurposed selvedge waste

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Abstract

Sustainability, biodegradability and circularity are important issues in the textile and fashion industry, with very few tangible solutions that have the potential to make an impact. The research team's project, which utilises waste from the Scottish textile industry and, in combination with PLA bioplastic, has made a 3D printable filament that has the ability to be mass produced in the future. The process of 3D printing, the materials used and 3D printed objects are increasing and many believe that digital rapid prototyping has the ability to revolutionise how we manufacture and consume. In this way, the waste textiles used in this project can be utilised in bulk and are not down-cycled, particularly if the filaments and 3D printed objects are branded and identified with the same narrative as the textile brands that they originated from.

Utilising waste wool, in particular, into a democratically available product is not a new concept. The 'shoddy' industry in Britain and America in the 19th and early 20th century and then in Prato in Italy exploited waste wool to create a 'new' textile. In Britain and America, this textile was always known to be inferior and 'inauthentic'. Harris Tweed as a brand was developed in a particular way that actively shunned the use of shoddy fibres. In Prato in Northern Italy shoddy was produced and sold quite covertly until recently when it has started to be actively sold as a sustainable material.

The development of 3D printing utilising specific Scottish textile waste in many ways mirrors the process of shoddy production. However this process and output has the ability, in the current climate, not only to expound its sustainable credentials, impart the story of authenticity, provenance and heritage of Scottish textiles but also to develop both of these aspects in a way that reflects the revolutionary changes that digital craft and material science offer. In an odd reversal, the processes, materials and perception of shoddy is reversed in this project, where the use of waste and clarity on the provenance of the original sources adds to the brand image, perceived 'luxuriousness' and authenticity of the 3D printed materials and potential products.

While the process of shoddy did not immediately inspire this project, many of the processes and concepts are unexpectedly similar and some early machinery involved in its production could have been used. With laboratory conditions, the scrap materials were not dangerous for the Research Assistant to work with. 'Waste' materials were mixed with biodegradable 'virgin' PLA pellets (although potentially this could have worked with recycled PLA).

This paper will give a historical contextualisation of this project, look at the meaning of authenticity, provenance and luxury in this instance and outline the relationship between this information and what happened in the labs and with the industrial partners. The paper will conclude with a discussion on how this 3D printable material related to ideas on the heritage of Scottish Textiles and perceptions of it.

1. Introduction

This paper will look at the inspiration for the 'embedded meaning' in a new 3D printable material created at Edinburgh Napier University, in a collaborative project between the schools of design, advanced materials and several industrial partners from the Scottish textile industry. This project combined selvedge waste, from looms and knitting machines, and combined this with PLA (Polylactic Acid) plastic, known for its sustainable credentials, to produce a 3D printable filament. While the process was somewhat time consuming and had to be refined by a research assistant from a material science background, simplistically, it appeared to mirror the process of 'shoddy making'. This involves (as it is still made worldwide, to a certain extent) scraps of waste and recycled textiles shredded and combined with 'virgin' materials before being re-spun. In the case of the 3D printable 'shoddy', the material was extruded. However in Britain, aesthetically useful shoddy is no longer made. Several of the original old factories in Yorkshire, still using equipment from the nineteenth century in the same factories, shred textile waste, but not made into an actual textile, despite it seeming like a favourable, sustainable material. The 'shoddy fibres' made in Britain are 'down-cycled' for cushion inners, insulation and even compost.

2. This contemporary and archival literature based research looks at shoddy's inception and production, how it became politicised and rejected in Britain and America (but continued in Italy), how concepts of 'authenticity' and Walter Benjamin's ideas on 'aura' may be embedded into a material itself and how these can apply to a 'substance', including a new material that can be 3D printed, rather than just the finished objects. **Shoddy**

Shoddy is a textile, predominantly made from wool, spun together combining shredded fibres of recycled textile mixed with new wool fibres in various proportions. Before the industrial revolution, when many of the processes involved in spinning and weaving took place in the home, leftover woollen materials would have been kept and used as a fertilizer. As the volume of textile waste increased with factories and manufacture and its distribution changed, textile waste would build up in built-up factory settings. All stages in the production process would create waste with the potential for reuse. (Shell, 2014)
Shoddy's advent in the early nineteenth century in England, as both a textile product and industrial process, was made possible by the pre-existing infrastructure of the conventional wool and paper industries and the development of specially purposed machinery for sorting, grinding, scouring and baling of recycled and waste wool. The development of the process of shoddy manufacture is primarily attributed to the mill owner Benjamin Law, in Batley, West Yorkshire, with the first shoddy cloth being dated 1813. (Jubb, 1860) Shell's research (2014: 279) said that,

'it occurred to Law that torn woollen rags could be further shred and then re-spun into a kind of 'renaissance' yarn which could be woven into a new type of fabric : a more economical incarnation of wool.'

In addition to this, Law's brother in law, Ben Parr, is credited with 'inventing' the particular piece of equipment for shredding textiles – two cylinders with metal comb like teeth that tear up the rags where the 'swifts' meet.

(Jubb, 1860) These came to be known as ‘devils’ in the nineteenth century. Three different kinds of wool waste could be turned into shoddy – ‘refuse’ from the textile manufacturing industries, off cuts and recycled rags. (Shell, 2014)

Literature from the nineTait, teenth century reflects the ‘wonder’ and romance of the process tempered with references to the harmful working conditions that were very particular to this burgeoning industry. Literature on the shoddy industry is scarce, with ‘The History of the Shoddy Trade: Its Rise, Progress and Present Position’ by Samuel Jubb, written in 1860, being the only dedicated publication from the nineteenth century. However it is talked about, as experienced, in a small number of texts.

In Tait’s book ‘Yorkshire: Its Scenes, Lore and Legends', published in 1888, he said,

‘The trade or occupation of the late owner, his life and habits, or the filthiness and antiquity of the garment itself, oppose no bar to this wonderful regeneration; whether from the scarecrow or the gibbet, it makes no difference; so that, according to the change of human affairs, it no doubt frequently does happen, without figure of speech or metaphor, that the identical garment today exposed to the sun and rain in a Kentish cherry orchard or saturated with tobacco smoke on the back of a beggar in a pothouse, is doomed in its turn to grace the swelling collar, or add dignified proportion to the chest of the dandy. A heterogeneous collection truly to be shredded by ‘devils’ into mungo fibre, re-spun and re-woven, and thus resurrected into new material for the backs of people who little dream of the various vicissitudes through which their garments have previously gone.’ (Tait, 188 : 28)

In White’s book ‘A Month in Yorkshire’, written in 1858, he said,

‘Batley – the centre of the shoddy trade. Hither are brought tatters from pediculous Poland, from the gipsies of Hungary, from the beggars and scarecrows of Germany, from the frowsy peasants of Muscovy; to say nothing of the snips and shreds from monks’ gowns and lawyers’ robes, from postilions jackets and soldiers uniforms, from maidens’ bodices and noblemen’s cloak.’ (White, 1858 : 351)

He also said,

‘The folk of the surrounding districts are accustomed to make merry over the shoddy-makers, regarding them as Gibeonites [a distinctive race, separate from the general masses], and many a story do they tell concerning these clever conjurors, and their transformation of old clothes into new.’ (White, 1858 : 358)

By the end of the nineteenth century the centre of manufacturing for recycled wool had moved to Prato in Italy. According to Hamilton and Fels’s research (2013), after the Second World War, several factors contributed to Prato being a centre for ‘wool regeneration’ including demand for warm clothing, limited availability of fuel for home heating, few plentiful sources of virgin wool and the arrival in Italy of bales of donated clothes from America. The piles of used garments were sorted by colour then turned into fibres after being soaked in an oil and chemical mixture to soften the wool and reduce the static electricity. The fibres were then spun, dyed and woven into cloth. This varied slightly from the original, dusty processes in the Batley mills.
The story of the ‘marvel’ of shoddy, particularly in Britain, appears to be lost and is seldom referred to in discourse around sustainability and waste in textiles and fashion, despite the process being a potentially viable outcome. Many of the ‘innovative’ processes used in the author’s 3D printing project, such as pulverisation, pellet making, extrusion, and the research team’s excitement when the 3D printable filament was made then actually printed, seems to be akin to the early shoddy ‘alchemeic’ outputs, but without any negative associations of the early manufacturing processes or the political subtext.

3. The politicisation of shoddy

As with much of the textile industry in Britain during the Industrial Revolution, the conditions involved in the production of shoddy were dreadful. The dangerous sharp teeth of the grinding machines and the dust-like quality of the ground, often dirty textiles, which was breathed in by the workers, added to this reputation. The machines became known as 'devils' and ground textiles were 'devil's dust'. According to Shell (2014: 279), this term was thought to have been first publically coined in 1842 by William Ferrand, an MP representing a substantial region of West Yorkshire in the House of Commons. He said,
'the process which is adopted by certain manufacturers, of buying up all the old rags they can obtain, which are torn into pieces by a machine, thus converted into a kind of dust, and are then mixed with wool, which is eventually manufactured into cloth. This dust, from its nauseous nature, and from its engendering numerous diseases, has been christened by the manufacturers and workpeople of Yorkshire the 'Devil's dust'.

Shell's research (2014: 380) found literature from 1861, in a piece called 'Devil's Dust' published in Chamber's Journal of Popular Literature, Science and Arts, where an impression of the machinery was described saying,

'the principal part of the rag-wool machine is the swift, a frame provided with ten or twelve thousand vicious-looking teeth, and that rotates six or seven hundred times a minute. Not merely torn, it is almost ground.'

Shoddy was predominantly used for goods for the 'working classes' including blankets. Few examples of nineteenth century shoddy garments exist, perhaps reflecting the poor longevity of the clothing, but literature suggests that it was used for simply making male suits and, most often, army uniforms. The political demonization of shoddy in the nineteenth century in America is directly related to poor quality uniforms made for the American Civil War. Confederate soldiers were known as 'ragged rebels' partly based on the inconsistencies and worn through state of their uniforms. Shoddy for the uniforms was shipped in from Britain and manufactured in America. War contracts to Jewish tailoring companies such as Brooks Brothers associated badly made shoddy uniforms with profiteering and, at this time, anti Semitic racism. (Bunker and Appel, 1994) In the United States, during the American Civil War, shoddy acquired its negative adjective meaning in the general consciousness. (Shell, 2014) The americancivilvoice.org (2014) lists several songs that were popularly known at the time including 'Song of the Shoddy', 'How are you, Shoddy' and 'I Wish I had a Fat Contract', written in 1864, with the lyrics,

But if I had a fat contract
To make clothes for de solders
De army coats and striped pants,
I wouldn't use no shoddy
Nor no oder stuff that's rotten;
But I'd use the very best of cloth,
Widout a bit of cotton.

Den I wish I had a fat contract,
But it ain't no use a-wishin'–
For I ain't a-goin' get it,
'Kase I ain't a politician.

This realisation that the 'corrupt' commercial potential of shoddy, insofar as it could be poorly made and knowingly sold as such was also recognised in England. White (1858: 358) said,

'We live in an age of shoddy, in more senses than one. You may begin with the hovel, and trace shoddy all through society, even up to the House of Peers. No wonder that the Univers declares that England is to perish by her commerce.'

In Engel's 'The Condition of the Working Class in England' (1892: 79 - 80), he talks at length on the inhumanity of the conditions in the textile factories in Yorkshire, but his dislike of shoddy had more to do with its bad quality. He said,
'and if a working man buys himself a woollen coat for Sunday, he must get it from one of the cheap shops where he finds bad, so-called 'Devils-dust' cloth, manufactured for sale and not for use, and liable to tear or grow threadbare in a fortnight.'

Towards the end of the nineteenth century, the manufacture of shoddy had, therefore, become synonymous with bad working conditions, with Devil's teeth and dust, the spread of disease, dishonest free enterprise, political corruption and the fabric itself became symbol of class division. The material became weighted with a negative meaning that prevailed over the actual substance of the fabric.

4. The concept of 'authenticity' and 'aura' in a material

4.1 Philosophical authenticity, aura and embedded meaning

The philosophical concept of 'authenticity' is complex and goes beyond merely whether something is the 'original', fake or hidden – it includes historical verisimilitude and interpretive, subjective attitudes around provenance, making and being. According to Rickly – Boyd, (2012: 270)

'Objective authenticity focuses primarily on the genuineness of objects, artefacts, structures, and the like. According to this perspective, no copy could ever be authentic. Because 'symbolic authenticity' is not based on an exact, discoverable original, it allows [people] to determine what is authentic. As they reject the binary nature of authenticity, constructivist authenticity is, therefore, fluid—a judgment, negotiable and contextual which gives rise to pluralistic interpretations.'

Existential authenticity refers to a state of 'being', grounded in Heideggerian philosophy. Authenticity resides in the subject in Heidegger's concept of 'Dasein' - a fusion between the self and external world. This was first written about in 'Being and Time' in 1927. (Heidegger, 2010) A search for an existentially authentic experience is a preoccupation with feelings, emotions, sensations, relationships and 'the self'.

The authenticity of a material can, therefore, be judged objectively, but does not immediately relate to preconceptions and existential perception of that material. In the case of historical shoddy, the material was loaded with meaning around political and commercial corruption, dirt and disease, so how the public felt about this, and their perception of it within society and how it directly related to their sense of 'self' would have been in contradiction. The material may have, therefore, been *authentic*, but it was authentically, emotionally unfavourable.

Contemporary literature around authenticity and embedded meaning within materials is becoming recognised. According to Miodownik in 'Stuff Matters: The Strange Stories that Shape our Man-Made World' (2003: 236),

'[Materials] are complex expressions of human needs and desires. We are all sensitive to the meanings of materials, whether consciously or subconsciously. And since everything is made from something, these meanings pervade our minds. In this way meanings are reinforced in our collective behaviour and so take on

collective meaning. There is a continual reflection, absorption and expression going on in the material world that constantly remaps the meanings of the materials around us.'

In this text, Miodownik suggests that material meanings are always embedded within, but may be perceptibly lost and overshadowed by its physical properties. He also adds that 'designers and architects' understand material's emotive value and manipulate it to 'create clothes, products and buildings that we like, that we identify with, that we want to surround ourselves with.' (2003: 247)
Further ideas on authenticity can be found in Walter Benjamin's concept of 'aura', in his essay 'The Work of Art in the Age of Mechanical Reproduction' in 1935. Benjamin states that 'the presence of the original is the prerequisite to the concept of authenticity' (2008: 220). 'Aura' is an experience, defined as a

'strange tissue of space and time: the unique apparition of a distance, however near it may be. The desire to get in touch with this uniqueness, to engage more closely with aura, is the catalyst for reproduction; ironically however, it is the aura, and therefore authenticity, which deteriorates with mechanical reproduction, as it, 'detaches the reproduced object from the sphere of tradition.' (Benjamin, 1935 : 22)

According to Benjamin, a work becomes 'authentic' only after the first copy of it is produced. However mechanical reproduction degrades aura and therefore authenticity. The reproductions are the aura, and the ritual around its making and viewing derives from the relationship between the original object and its 'socially constructed importance.' (Benjamin, 2008: 48) This further inspired his work on another aspect of the aura - the afterlife of an 'art work' - the ability of an object to exist outside its moment of time, to be reinterpreted. (Rickly – Boyd, 2012) By embedding an object in tradition, associated rituals establish aura and authenticity. Perceptions of the aura around shoddy may have changed over time from it being a dirty, corrupt, ineffectual material laden with notions of class and status, to one full of the characteristics of exciting new technologies and tenets of the Maker Movement, sustainability and the luxury and romance of traditional Scottish textiles.

4.2 Historical notions of authenticity and shoddy

Shoddy was linked to the deceitful nature of the 'shoddy magnates' but also became known as an inauthentic material. Shell said, (2014: 381) 'shoddy seemed to have no respect for boundaries making it hard to tell the pure from the substitute, the derivative from the fraudulent.' Like Engels, Carlyle was critical of the whole industry of textiles in England but his particular writings on shoddy focus on inauthenticity. He said,

'understand, if you will consider it, that no good man did, or ever should, encourage 'cheapness' at the ruinous expense of unfitness, which is always infidelity, and is dishonourable to a man. Universal shoddy and Devil's dust cunningly varnished over; that is what you will find presented to you in all places as ware invitingly cheap, if your experience is like mine.' (Carlyle, 1867: 12-13)

White's writings (1858: 358) mirrored this sentiment saying,

'Genuine broad-cloth can only be dressed by a teasel of Nature's own growing ; but shoddy, far less delicate, submits to the metal. From what I saw in the tenter-ground, I discovered that pilot cloth is shoddy; that glossy beavers and silky-looking mohairs are shoddy; that Petershams, largely exported to the United States are shoddy; that the soft delicate cloths in which ladies felt so comfortable, and look so graceful, are shoddy; that the 'fabric' of Talma, Raglans and paletots, and of other garments in which fine gentlemen go to the Derby, or the Royal Academy Exhibition, or to the evening services in Westminster Abbey, are shoddy.'

4.4 Authenticity and 3D printing

The author's project created a material that could be 3D printed that may convey the 'aura' of 3D printing – the space and time in which the material was made and its 'social construction'. While 3D printing has the ability to, in essence, 'mechanically reproduce' - when objects are made that are exact copies of others - 'authenticity' can be attached to the process in more multifaceted ways.
3D printing is often associated in popular consciousness with the Maker Movement. The Maker Movement is an umbrella term for independent makers (designers, inventors, traditional artisans and 'tinkerers' of all generations) who work as individuals or groups, often in open access facilities and sharing ideas utilising online group forums. According to Ratto, (2012: 17) the Maker Movement offers 'spaces for expression and exchange afforded by digital desktop fabrication [and is] helping to expand opportunities for material forms of civic engagement to the general population.' He also suggests that the process of making (often utilising 3D printers) within the maker movement, goes beyond mere object creation and comprehension of ownership and the 'copy' to involve a more engaged, highly personal, socially oriented process that reflects existential authenticity.

In addition to this, there is growing academic interest in the nature of digital craft in contrast to 'traditional' craft, in the way that it is considered as authentic. Turney (2009: 80) said,

While 'handmade objects are imbued with touch and therefore offer a sense of the 'authentic' in an 'inauthentic' world: 'they offer a connection to the maker through the skill and learning apparent in their construction and they demonstrate time spent in a way in which other objects cannot'.

Kettley's research (2010: 15) states that 'powerfully, contemporary making cultures tap into the desire to bring together the affordances of digital technology and the information sharing of the internet alongside the making, not just the buying, of things, the working with our own hands to construct material – or analogue – objects.' She also found that,

'[digital and traditional] craft objects provide contexts for moving in and out of experiences and for heightened awareness of somatic experience and engenders processes of meaning making rather than presenting predetermined significations.'

3D printing and the Maker Movement is associated, not only with craft produced by 'experts' but also by amateurs who often 'tinker' or expand on hobby interests, rather than approaching digital craft with preconceived ideas of what they are going to make or with knowledge of the conventions of making practices. According to Resnick and Rosenbaum (2013: 170),

'tinkering treats play as a vital context for thinking and learning. In its capacity to envelop us in a story, play can be a rich developmental space - one that allows us to treat boundaries as malleable, imagine and experience alternate realities [and] experiment with new roles.'

The 'aura' around the 3D printing material created in this project may embody ideas related to self expression, personal investment, feeling and emotion, meaning, freedom, social spirit and the authentic self by even being associated with 3D printing and therefore the Maker Movement. The digital nature of the craft brings with it an aura that is not preconceived ideas on the authenticity of mechanically made in quantity in comparison to individually hand made.

4.5 Authenticity and recycling

Conceptually, recycling and the complexities of the theories around Modern and Postmodern authenticity are not far apart – Benjamin dwells on 'mechanical reproduction' where the objects carry with them a fluid

representation of spaces and times to be personally rather than linearly interpreted. However, in this paper, *actual* recycled materials and their ability to carry aura that may be read through the material will be explored. In historical shoddy production, recycling had very different connotations linked to disease, profiteering and deception. Recycling and 'repurposing', as terms, can be unconsciously linked to contemporary perceptions on 'sustainability' and this carries positive associations that may attract the user and consumer and reflect who they wish to be – an affirmative version of themselves (although not necessarily their *authentic* self). According to Eirenfled, (2005: 23),
'the loss of authenticity, which occurs when our inner sense of satisfaction and wholeness wanes [and] is perhaps a critical factor in addiction to consumption and in the mood of resignation that follows the growth of technological modernity. Underlying cultural values will always trump technology and design in determining behaviour. It is at this bedrock level that the foundation of sustainability must be built.'

This research confirms that issues of sustainability can have deeper personal meaning than simply buying 'green-washed' products; it embodies personal values, attitudes and beliefs in how we respond to sustainability as individuals.

Moreover, the textile waste used in the filament has come from Scottish mills, from hand made, luxurious products – woven wool and knitted cashmere from prestigious textile houses. The whole provenance and back-story of the wool, the mills and the romance of an idealised, historical, 'Kail Yard' Scotland embedded in the filament. Scotland's textile production is not often associated with bad working conditions or excessive landfill waste, but the new material produced in this project, 're-presents' quixotic (rather than authentic) ideas around Scottish craftsmanship. This is a device that can be seen in branding practices in 'luxury' Scottish textiles. According to the findings of Collins and Weiss (2015: 1031),

'The narrative behind a product, its authenticity and provenance, are key drivers in luxury textile brands, with perceptions of quality of utmost importance. Long standing companies have interwoven provenances with their spiritual birthplaces, people and environments, which can be leveraged in product introductions and branding.'

Littrell's research (1990: 74) is less prosaic on the nature of authenticity in provenance-laden textiles saying,

'craft meaning [is] evolved from experiences and encounters in obtaining the textiles and from their use in the home and for clothing. Crafts and the memories associated with them help consumers participate in non-ordinary experiences, sample indigenous lifestyles, expand worldview, differentiate the self or integrate with others, enhance feelings of confidence, express creativity and experience aesthetic pleasure.'

Littrell argues that authenticity in indigenously sold textiles (or textiles sold referencing their geographic source) lies in the 'non-generic experience', particularly if the buyer has experienced the setting of its production in some way. Utilising Scottish textile waste and presenting the narrative around it may authentically engage the user advantageously. In other ways, the 3D printable material is a 'fake', inauthentic copy of the original textile it was made from.

Prato has produced a particular product that builds on the 'hidden' shoddy industry that has developed there. The Cardato Recycled brand, which involves many of the factories and businesses within Prato, sell its product on 'being produced in the Prato district; being made with at least 65% recycled material (clothing or textile scraps). (Camara, 2014) Certificates are issued to individual lots of products. Cardato appears to have used recycling and perceptions of sustainability as a sellable concept, using certification as a symbol of objective authenticity.

4.6 Authenticity and Plastic

This project also utilises selvedge off cuts and PLA, a compostable bio-plastic made from plant matter. This material also carries with it a particular weight in the emotional public consciousness, recently conspicuously reflected in 'sustainable Lego' – a range brought out in this material, with branding around PLA's attributes. (Smithers, 2018) For consumers to choose and engage with sustainable products appears to be a process led by the deeper felt, emotional meaning. In the case of Lego, it also involves children and play, with associated ideas around autonomy of self-expression. (Gauntlett and Holzwarth, 2006). PLA is usually, also, the first choice of material in open access 3D printing maker spaces, aligning it with the tenets of the Maker Movement.

However, the word 'plastic' carries with it connotations of being artificial, invented, simulated, created in a modern, mechanised, socially empty environment and of, therefore, being inauthentic. In tourism, 'plastic experience' is also used to represent one that is inauthentic. Taylor (2001: 24) said of this,

'Enamoured by the distance of authenticity, the modern consciousness is instilled with a simultaneous feeling of lack of desire erupting from a sense of loss felt within our world of mass culture and industrialisation and giving rise to possibilities of redemption through contact with the naturally, spiritually and culturally "unspoilt".'

The new material created in this project, while being 'plastic', appears to embed a wide ranging narrative around recycling, sustainability, modernity, egalitarian making opportunities *and* Scottish geography and provenance, which Taylor, for example, believes instils a more genuine, revered, authentic experience.

Conclusion

Shoddy was a process and a material invented during the industrial revolution when the environments in many of the industries at that time were notorious for their appalling working conditions and for the dishonesty of the entrepreneurs in their pursuit of profit, particularly in Britain and America. Shoddy production also had the additional spectacle of the 'devil' and the 'devil's dust'. This was further added to with the widely held idea that shoddy concealed dirt, diseases and that the old clothing used for recycling came from someone who was foreign, destitute or criminal. Although the idea of branding products did not fully develop until much later, the 'aura' surrounding shoddy, at this time, did not ameliorate its status and popularity. Shoddy carried with it notions which were emotionally felt by the population, reflected in, for example, popular songs and prejudiced beliefs. In this way, shoddy precipitated an authentically undesirable experience for the user, wearer, buyer, observer or maker, around deeply felt notions on the 'self'. These considerations went beyond objective concepts on whether shoddy was genuine or fake.

In Prato, a different reputation and system surrounded the development of shoddy. Italy appeared to responded to the challenges faced after the Second World War by taking on a process that was difficult, somewhat unpleasant and required hard work to make the business thrive, albeit with somewhat better working conditions and processes than the nineteenth century English and American shoddy mills. More recently, this has changed with Prato using recycling to imparting their product's sustainable credentials. The recycling of unwanted textiles in Cardato is being utilised in a positive marketing strategy employing emotive expression around its sustainability rather than hiding the recycled textile's background and circumstances. The user, wearer, buyer, observer or maker may then experience Cardato authentically, as an idiosyncratic, geographically exclusive product.

In this study, authenticity has been demarcated objectively and existentially. Historic and contemporary shoddy, and the new 3D printable shoddy, have been analysed using both definitions. The constituents of the new material – its ability to be 3D printed, that it is recycled, sustainable, has geographically provenance and

that it is made from a particular plastic all carry with them particular perceptible, complex meanings that go beyond their utility. These meanings appear to have moved from eschewing disease, profiteering and deception to themes around egalitarian politics, social inclusivity, civic engagement, expanded worldviews, mediated personal narratives and a heightened awareness of the body and 'self'.

The processes undertaken in this project emulate Prato shoddy in many ways. Although this project could have taken place anywhere, the inclusion of Scottish waste textiles, perceptions of romanticised Scotland and the aura around digital craft and sustainability will be a starting point for further investigations into whether a new material can embed objective and existential concepts of authenticity. It will look into whether characteristics that were previously demonised, such as the inclusion of unusable 'floor sweepings' within the 3D printable material, can be confirmatory. It is anticipated that ideas around what makes a material and then an object 'authentic' can repositioned.

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