

## Aesthetics, Economics and the Enchantment of Cloth

Janis Jefferies & Barbara Layne

### Abstract

In a changing world everyone crafts, designs and engages in making: each individual person and each collective subject, from communities to cities and regions, can define and enhance a life project. We are witnessing an unprecedented wave of social innovations, sometimes using technology and sometimes not. As these changes unfold, an expansive open set of process and practices in which new solutions are suggested and new meanings are created. Most revolutions are about energetic movement and upheavals; even if ideas take a while to become ideologies, we don't think of them as slow events. But the phrase also makes us think of an insistent, evenly paced, circular movement of the 'what-goes-around-comes-around' variety which is about making connections, something that forms the basis of an on going collaboration between Janis Jefferies (London, UK) and Barbara Layne (Montreal, Canada). Collaboration, making and researching take time, and embody transformation. We have told ourselves many stories over the years about textiles as we have delved into archives exploring how we might transform our enchantment with cloth into newer forms of craft based technologies. Immersed in social innovation, all of our work is in one sense 'crafted' through time, which is what makes it so compelling. But, it is also made in the context of an interchange/exchange i.e. a conversation between us and others (the sewer, the PhD student, the technologist) who tell us stories of their own crafted experiences. This paper draws together 20 years of reflective, interdisciplinary practice, focusing on *The Enchantment of Cloth* (2014-2017), the archives and objects, and the teams who have come together in the performance of this research.

### In the Beginning

This is the fourth international research collaboration between Barbara Layne (Concordia University, Montreal) and Janis Jefferies (Goldsmiths, University of London) and their various teams of graduate students and other collaborators. Their first joint publication, *Electronic Arts: Hacking the Museum*<sup>1</sup>, was based on a series of conversations by train and email on the occasion of Layne's solo show of the same title at the Glass Box, Salford, University of Manchester in 1996. Results of their first major collaborative project, *Textiles and Transmissions* included the *Black Wall Hanging* originally shown at The Hub in Lincolnshire, UK in 2006 and further displayed in Boston, Washington DC and Marseille, France. A paper on this work was presented at TSA in Toronto (2006) entitled *Text and Textiles: New Writings from Spam Tales*. The interactive cloth included a flexible, handwoven LED display that presented sayings from spam but also information on the former seed factory that has now become The Hub. It also included quotes from the scientist Isaac Newton who was born in Lincolnshire. As the piece traveled to new locations, more texts were added to the cloth's displayed memory, just as any textile picks up signs of wear and use from its own life's journey.

However, Layne and Jefferies are arguably best known for the *Wearable Absence* project, with assistance from a diverse team of specialists and students including Dr. Mohammed Soleymani,

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<sup>1</sup> Barbara Layne & Janis Jefferies, 'Electronic Arts: Hacking the Museum', Art, Technology, Technique (ACT series). ed John Gange, London: Pluto Press, 1998.

Hesam Khoshnevis, Diane Morin, Jake Moore, Andre Arnold, Meghan Price, Maryam Golshayan, Professor Robert Zimmer, Miguel Andres-Claveras, In-young Cho and Helen Watson. The *Wearable Absence* system includes an interactive jacket that responds to biometric data mined from the body. Calibrated to a particular individual, it can analyze a person's emotional state, and seek out an "appropriate" response from an online database of a friend, lover, relative, etc. Corresponding texts, sounds, or video files are then played back through the garment, in order to provide the wearer with "what they need". The project was funded by the Hexagram Institute, Government House of Quebec, London, Arts and Humanities Research Board, Social Sciences and Humanities Research Council, Canada, Arts and Business New Partners Scheme, UK.



*Wearable Absence. 2009. Interactive jacket with bio-sensing devices and multi-media outputs.<sup>2</sup>*

During the 4-year research period *WAb* received national and international coverage with over 1 million hits on Google. The project was launched at the FOFA Gallery as part of Congress 2010 at Concordia University in Montreal. Media coverage of this project has appeared in print, on TV and on the web worldwide in countries ranging from the Canada, USA, UK, to India, Germany, France, Russia, Columbia, Spain and Egypt, and media outlets such as the BBC, NBC, FOX News, Medical News Today and Science News. *Wearable Absence* was shown at the Edinburgh Science Festival in April 2011, and as part of *Sensual Technologies*, ISEA 2011. It was included in an exhibition curated by Sarah Braddock Clark that explored the relationship between the body and sensual/sensing technologies through performance and dynamic garments for *REWIND INTO THE FUTURE*, at the National Museum of M. K. Čiurlionis, Kaunas, Lithuania. It was featured in *Wearable and Mobile Interactions: Contemporary Perspectives in*

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<sup>2</sup> All photos by Studio subTela except as indicated.

Art, Design and Science”, Leonardo Press, 2103. Jefferies was invited to contribute a chapter ‘Wires and Wearables’, to an anthology of writings, *This Pervasive Day The Potential and Perils of Pervasive Computing* (Ed. Jeremy V Pitt) as an European funded output for Imperial College Press in response to the Edinburgh Science Festival.

### **The Enchantment of Cloth**

Jefferies and Layne’s current research, *The Enchantment of Cloth*, is an interdisciplinary project that aims to reinvigorate some of the wealth of textiles in the archives of museums in Quebec, Toronto and London by studying and reworking historic techniques and imagery. In this regard textile objects that used precious metal threads with the techniques of couching are transformed into conductive circuitry appropriate for the communication technologies of the 21st century. Generously funded by the Social Science and Humanities Research Council of Canada, the research also examines social privilege associated with wearing precious metal threads in the past while raising questions about the implications for wearable technology in contemporary times. How do wearable technologies indicate status while facilitating social connections in real time?

### **Museums and Archives**

Museums provide a dynamic context for active translation; on the one hand they are guardians that strive to stabilize that which is destined to physically come apart and on the other, they are also vehicles that incite conflicting narratives, emotions, inspiration and renewal.



*Left to Right: Janis Jefferies, Geneviève Moisan and Barbara Layne study laid gold threads in Toronto. Canopy, Gujarat, India, mid 19<sup>th</sup> century, From the Opekar / Webster Collection, T94.0787, Collection of the Textile Museum of Canada.*

Textiles are fragile objects – they wear off, get torn apart, fade and crease—nevertheless that can tell us a range of stories about fashion and taste, value, everyday life, status, economic organizations, trade, law and politics, transmission of culture and communication, body, technology, notions of public and private, ritual, gender, continuity and historical change.

Textiles also form the largest category of designed objects available for study, whether as objects in their own rights, as constituent parts of fashion, furniture and interiors, or as industry – the latter embracing production, trade, working environments and experiences.

On an initial visit to some of the British Museum’s textile archives held at its stores at Blythe House, in West London in April 2015, Barbara Layne, Janis Jefferies and Research Assistant Geneviève Moisan were able to view a number of richly laid metal fabrics including spectacular examples from the Balkans, Central Asia and Ethiopia. With the expert assistance of Curator Helen Wolf, the team studied a variety of couching techniques in which a needle and thread anchor the alloys of copper, silver and gold in place.

One example of a textile that is housed in the British Museum’s collection and is being adapted for a new interactive project is “The Branko Belt” (c. 1350). The Branko Belt was made by laying or couching gold and silver threads by hand, using embroidered silk threads to highlight the shapes. The belt was worn by a Serbian magistrate in Constantinople (now Istanbul) and indicated his status as an aristocrat. Studying the nature of the laying, the embroidery, the patterns and colors, we imagined “patch” antennas using the shapes of the Byzantine animals from the Branko Belt. These images were translated with a Tajima Laying Machine that laid conductive metal threads onto a textile substrate according to a computerized design.



*The Tajima Laying Machine at Concordia University.*

The mythical wyvern, along with a falcon and a bear became antenna designs fashioned on three dresses that were intended to receive and transmit communications data. Each dress features a woven LED array, which is triggered by a “controller” jacket, whose antenna is in the shape of a panther. (All animals were original to the Branko Belt). When the wearers face each other, a wireless connection is made through these irregularly shaped antennas. As the garments move around a space, the signal strength will become stronger or weaker, and in response, the LED display on each dress will change. The result is scrolling messages that feature accounts of these

animals in the bestiary during medieval times as well as other historic and contemporary social situations.



*Bear Antenna from the Branko Belt Project. Left: finished textile antenna; Center: assignment of laying stitches for conductive silver thread; Right: assignment of decorative embroidery stitches.*

The designs were initially produced from drawings, notations and photographs of the Branko Belt at the British Museum, then put into a vector based software, assigned functional laying stitches, and then decorative embroidery stitches. The Tajima machine couches the silver threads and embroiders the threads that carefully outline the figure onto linen yardage. The base fabric is then cut to a garment pattern. After extensive mathematical proving and testing in an anechoic chamber, the animal figure becomes a highly responsive antenna, specifically, a “patch” antenna. It is then connected to other electronic components including an X-Bee Wireless transmitter, an Arduino microcontroller, and a hand stitched LED array.



*The Branko Belt Project (2017) by Barbara Layne, Janis Jefferies and the Studio subTela Team. Controller Jacket (left) and three Receiver Dresses (right). Linen, conductive silver thread, polyester embroidery thread and electronic components.*

Contributions were made from a strong interdisciplinary team at Studio subTela, one of the labs of the Milieux Institute for Arts, Culture and Technology at Concordia University. The team includes Muhammad Mustafa Tahseen who led the technical development of the antenna communication systems (supervised by Dr. Ahmed Kishk). Sarah Majidi documented the circuitry and code while Donna Legault created the circuit design in conjunction with programming by Hesam Khoshnevis and Martin Peach. Geneviève Moisan's museum observations and technical skills resulted in the designs and production of the antenna patches using the Tajima Laying Machine. Claire Nadon also participated in museum observation as well as garment design and construction. Ryth Kesselring created the flexible LED arrays in the dresses and Tim Belliveau was involved in the content management of our textile archives and supplied the three dimensional vector drawings needed to verify antenna efficiency. However, the process was not a linear progression and everyone was involved in multiple steps, with each consulting one other throughout the design, testing, debugging, and garment production.

Traditional patch antennas are based on relatively simple geometric shapes that can be perfectly defined by mathematics. Given the complexity of our new "art antennas" which have variability in shape and use non-standard materials, we were pleased to discover ways to adapt them so they can perform at a high level. These antennas are not only functional but can also be read as symbols that offer visual communication clues such as an identifier of a social organization or other cultural grouping.

In a related development in 2016, Layne collaborated with the Montreal artist and fashion designer, Lauren Osmond to produce a series of garments entitled Maxwell's Equations. These garments were built on the technical innovations of the Branko Belt project, but in this case, reference the physicist James Clerk Maxwell who developed the theories of electromagnetism that are still being used today. His pioneering research underpins all radio technologies such as power generation, electric motors and from our point of view all wireless communications. The shapes of the Maxwell Dresses, along with the scrolling messages all reference the equations, ideas, and even romantic poetry used in revealing the secrets of electromagnetic radiation.



*Maxwell's Equations by Lauren Osmond, Barbara Layne and the Studio subTela team. 2016.*

In addition to the British Museum, research visits were also paid to the Clothworkers' Centre for Textiles and Fashion Study and Conservation, also housed in Blythe House. Already home to the V&A's collections, including the Archive of Art & Design, the Clothworkers' Centre has custom built storage for around 104,000 objects. It aims to provide physical access normally associated with a print room where you can investigate, in microscopic detail, treasures such as 16th century raised metal stump work, 19th century Bosnia & Herzegovina military jackets, a Book of Common Prayer, and splendid Elizabethan caskets.



*Janis Jefferies and Geneviève Moisan view the structure of gold threads through a digital microscope at the Clothworkers' Centre of the Victoria & Albert Museum (London) in 2015.*

As well, luxurious, metal, silver and gold threads were highly prized and often embedded in Elizabethan white gloves. Such indicators of wealth and technical value were also used in an economic exchange of spices as part of the emerging trade routes that were to become a significant feature in Britain's colonial expansion.

On the other hand, the Textile Museum of Canada, based in Toronto, was renamed in 2000 to reflect its national standing and become more integral to Canadian cultural life. It houses a collection of over 13,000 handmade traditional and historic textiles from around the world and, like other collecting institutions, strives to protect its fragile holdings from the effects of time. The easily accessible online database and Curator Roxane Shaughnessy's helpful preparation for viewing our selections from the permanent collection, made the Textile Museum of Canada a very rich research resource in which to discover some of the most opulent examples of laid gold and silver textiles.

### **Chinese Textiles: Ranks and Badges**

Canada's involvement with Chinese textiles has a long history that can be dated back to the 16th century. The first collections were acquired in 1961 from Chinese immigrants involved in the Gold rush. However, the Textile Museum has a significant collection of imperial Chinese

textiles. Not only was silk a privilege of class but the use of couching gold wrapped threads with silk reached a sophisticated level of skill in the production of court robes. Couching with gold was popular for the embellishment of luxury goods through trade and Western contacts during the Tang dynasty.

“Gold was pounded into flat sheets from which shapes were cut and then stitched onto cloth. Drawn wire was attached to the surface with a second needle and thread. Surface applications of gold to embellish articles of dress were the earliest use of metal, because early civilizations lacked the technology to weave complex patterns”.<sup>3</sup>

What became of interest to us during our visit in October 2015 were rank badges. These distinguished title, rank and status and were embodied in court attire in the 19th century. Dragons marked the first eight of twelve degrees of aristocrats. Nobles below the eighth degree and all ninth degrees of military officers were assigned animal insignia. The leopard insignia badge was used as the emblem for the fourth-ranking military officers. Nine varieties of birds marked the rank badges of civil officials. Those holding the fifth grade were entitled to use the Mandarin duck. It also transpires that silk was of great importance in China’s development in the 19th century. By ensuring that taxes and official wages were paid in silk and controlling trade within and outside of the Empire, China’s rulers were able to exert control over silk processing and its distribution.<sup>4</sup>



*Vest, China, 19<sup>th</sup> to early 20<sup>th</sup> century, Gift of Fred Braida, T88.0251, Collection of the Textile Museum of Canada  
Photo by Maciek Linowski. Detail by Studio subTela.*

<sup>3</sup> Victoria Z Rivers. *The Shining Cloth: Dress and Adornment that Glitters*. London: Thames and Hudson, 1999. p. 56.

<sup>4</sup> Feng Zhao, *Treasures in Silk: An Illustrated History of Chinese Textiles*, Hong Kong, 1999

Detachable rank badges are of particular interest to the *Enchantment of Cloth* in relation to contemporary popular culture since they could denote belonging to a particular club (i.e. motorcycle) or group (a pop band). Updating and reflecting on ideas of status and communication is integral to how contemporary forms of textile can reinvigorate archives by the introduction of new technologies that can enhance social communication. In ‘Archive Fever’, Jacques Derrida makes the argument that even though archives are a depository of civic record and public social history, they are stocked with personal, intimate traces of personal lives.<sup>5</sup> What might the concept of the archive mean today? How might textiles be used in this context?

We may never know the intimate experiences of those who wore garments rich in the ‘crafted’ couching skills of silver and gold threads, but museums and their archives provide a unique context for active translation. As carriers of fact and fiction, narrative embellishment and with the ability to provide a sense of belonging even if only temporarily, Sarah Quinton explains, “Textiles are the plus ultra of the impossibility of the fixity of things and ideas.”<sup>6</sup>



*Research Assistant, Claire Nadon making notations on a luxurious garment laid with silver threads. Coat, Albania, late 19<sup>th</sup> to early 20<sup>th</sup> century, Gift of Owen Shime, T85.0202. Collection of the Textile Museum of Canada.*

We have told ourselves many stories over the years about textiles as we have delved into archives exploring how we might transform our enchantment with cloth into newer forms, these crafted, bespoke textiles that embed technologies to impart new conversations. The research

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<sup>5</sup> Jacques Derrida, ‘Archive Fever: A Freudian Impression’, in *Diacritics*, Vol. 25. No. 2, Summer 1995. Maryland: the John Hopkins University Press. 1995. pp. 9-63.

<sup>6</sup> Sarah Quinton, *Mobile Landscapes: the interdisciplinary of textile culture at the Textile Museum of Canada*, unpublished paper presented at the 1<sup>st</sup> Hangzhou Triennial, China, 27<sup>th</sup> September 2013.

reaffirms that textiles occupy a central position within the realm of material culture by contributing to the discussions of relationships between artistic practice, social issues and scientific advancements.

There are three central points to remember from this paper: that Layne and Jefferies have worked with complimentary sets of researchers and teams drawn from many cultures and languages; secondly their commitment to explore historical textiles from international archives and reinterpret them with contemporary experimentation; and, thirdly that as an art/science research project, *The Enchantment of Cloth* recuperates characters such as Newton, Branko and Maxwell within the construction of the cloth itself. The material meaning is not an application or a supplement, but a consequence of the integration of multiple disciplines.