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14.

Cybercouture:
The Fashionable Technology of Pauline van Dongen, Iris van Herpen and Bart Hess

'[Technology] is an open-ended beginning, an infinite game calling us to play.'

—Kevin Kelly (2010: 345)

Anneke Smelik

Introduction

One of the exciting new fields in the creative industry is the integration of fashion and technology. Wiring complex systems of microprocessors, motors, sensors, solar panels, (O)LEDs or interactive interfaces into fabric, textile or clothing turns them into smart garments that have a certain agency of their own. Designers experiment with these 'smart materials' to create thrilling examples, like a dress that connects you to Twitter, a catsuit that visualises your emotions and trousers that change colour or measure your vital functions. These examples show how '[t]echnology is now evolving faster than fashion trends,' as designer Katrina Barillova claims (in Quinn, 2002: 73). This new field is called 'wearable technology' or simply 'wearables'. Although I use both of these labels interchangeably in this chapter, I prefer the term 'fashionable technology', following Sabine Seymour (2009, 2010), to bring the field of advanced technology more decidedly to the field of fashion. Given the futuristic look of many designs, perhaps the term 'cybercouture' is even more apt (Smelik, 2012).

If the 'future of fashion is now,' as a Dutch exhibition (Autumn 2014) in the Museum Boijmans van Beuningen in Rotterdam was called, it is fitting to finish this book with a chapter on cybercouture. Interestingly, Dutch artists and designers such as Pauline van Dongen, Iris van Herpen, Bart Hess, Daan Roosegaarde, Marina Toeters, Karin Vlug and Anouk Wipprecht form the vanguard in the international field of fashionable technology. Some recent examples are the 3D-printed designs of the collection 'Escapism' by Iris van Herpen (2011), wearable robotics in the 'Robotic Spider Dress' by Anouk Wipprecht (2012) or wearable solar panels in the 'Wearable Solar Dress' by Pauline van Dongen (2013). In this chapter I first situate research on fashionable technology in the Netherlands by giving a short sketch of the field. I then evaluate how fashion and technology become more and more integrated and how this development changes the cultural value of fashion, especially in the transformative relation to the human body and identity. In the second part of the chapter I therefore pay particular attention to the intriguing nexus of the relation between fashionable technology and the human body and identity. I do so by discussing the work of three Dutch designers, Pauline van Dongen, Iris van Herpen and Bart Hess, who each move between art, fashion and technology.

Dutch Experiments

In the last few decades, interdisciplinary research has been carried out at the crossroads of art, fashion, sports, gaming, medicine and many industrial branches of technology. In the Netherlands research takes place at a variety of places, often working in close cooperation: art and fashion academies; cultural institutions; laboratories of small companies, large companies, big corporations, and technical universities; and finally in so-called 'fab labs' that allow students to use expertise in the labs in exchange for their designs. The experiments are presented at quite different locations, sometimes on the catwalk, sometimes as a performance at a cultural festival, or in games, at sports events or academic conferences.

There is one Dutch city in particular that presents itself as the design city: Eindhoven, with its Faculty of Industrial Design, the Design Week, the many artist, designer and architect ateliers in the old Philips factories in 'Strijp' and the High Tech Campus of the Dutch electronics and light multinational, Royal Philips. Philips Design runs a laboratory where artists, designers and scientists work together on the interaction between body, clothing and environment. These are experiments for what they call 'the far future', not with the aim of developing technological clothing that is wearable but rather to study emergent trends and behaviour. In 2006, artist Lucy McRae, for instance, created the 'Skin Probe Dress' in conjunction with Philips. Through biometric sensors the dress explores the space between the body

130. Bubelle Blush Dress, developed by Lucy McRae for Philips Design, 2006.

and the near environment. Electrons in the fabric can register and visually represent the emotions of the wearer: the dress will turn green when you are jealous or red when you are in love. McRae also produced the 'Bubelle Blush Dress' for Philips in the same year, exploring what they call 'sensitive' technology through biometric sensors. This dress is surrounded by a delicate 'bubble', which responds to skin contact by illuminating various patterns. In probing the skin, such designs behave differently depending on who is wearing them and therefore exhibit non-programmed behaviour.

Working in the far future design research programme of Philips, McRae met Dutch artist Bart Hess in 2007, and they launched several projects together as the duo LucyandBart. For Philips they worked on an 'Electronic Tattoo' project, a digital tattoo augmented by touch. In 2008, a collaboration between Philips and designer Anouk Wipprecht (see profile in this chapter) resulted in the 'Lumalive' dress with flexible displays. Most recently, Pauline van Dongen created 'Mesopic' (2014), a project that aims to increase human visibility and safety in low-light outdoor scenarios. For this garment, Philips' textile LED ribbons have been integrated in the fabric, resulting in a light-emitting jacket that merges with the city-lights glowing in the nocturnal surrounding.

These are just a few examples to illustrate the vibrant climate for experiments in fashionable technology, in this particular case stimulated by a big cooperation, Philips. The Dutch fashion academies are also at the forefront of new developments. The Amsterdam Fashion Institute, for example, has integrated 3D virtual prototyping in its curriculum (Boekman, 2012: 53-54). The students learn how to digitally create a better fit, which costs less time, leads to less need for samples, less transport and less use of material. While virtual prototyping thus enhances sustainability, it also allows more freedom in the design process by digitally creating variations in form, material, prints and details. Pushing the boundaries of software capability, students research how complex designs can be developed.

As such, students and designers continue an honourable tradition in Dutch product design and industrial design dating back to the beginning of the twentieth century (De Rijk, 2003; Simon Thomas, 2008). Dutch product design has always been more successful and internationally better known than Dutch fashion, although as Maaike Feitsma (2014) argues, Dutch fashion has ridden the successful wave of Dutch design since the 1990s. The point here is that the Netherlands can boast some very successful Faculties of Industrial Design and several renowned art, design and fashion academies in major cities across the country. This has created a generation of young designers who are eager to cross the disciplines of art, design, fashion and technology.

The Smart Materials of Fashionable Technology

Fashionable technology is versatile and can therefore be quite bewildering: it can range from e-fashion, smart materials, wearable electronics, solar energy and 3D printing to bio-couture and nanotechnology.[1] Recent studies in the field provide an overview of techniques and applications (Mattila, 2006; Cho, 2010), or summarise its developments and actors (Quinn, 2002, 2010, 2012; Seymour, 2009, 2010), but, to date, few studies critically reflect on the socio-cultural dimensions of fashionable technology (Toussaint and Smelik, 2016).

Like most technology – the internet, for instance – wearable technology has its origin in military research and space travel (Quinn, 2002: 98). While most innovations have not been incorporated into our daily clothes (yet), others have been successful in, for instance, sports gear. One of the most successful markets for wearables in the Netherlands is the field of safety, such as the military, police and fire brigades.[2] Fabrics and textiles have been developed to protect soldiers, police officers

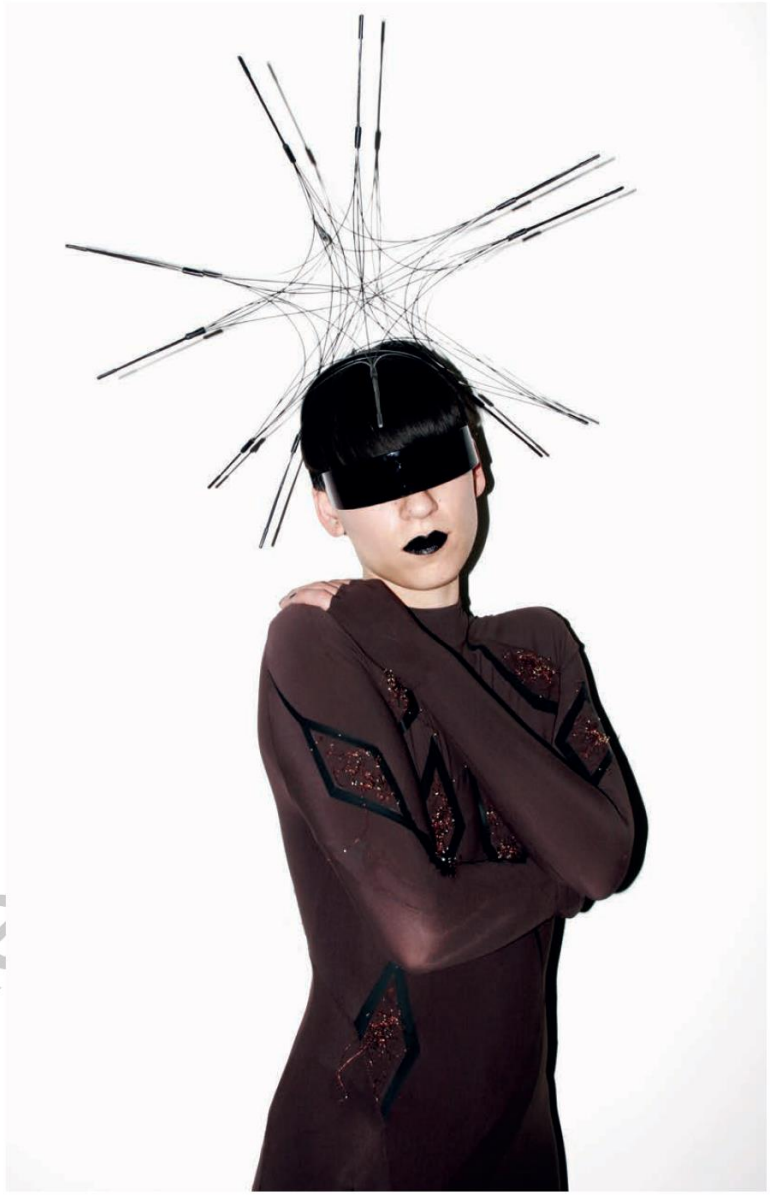
or firemen from all kinds of impact, be it fire, water, bullets, knives or debris. An example is the European Prospie project that produced a garment measuring core body temperature as an efficient method for monitoring heat stress amongst workers in hot conditions; it was tested at Tata Steel (Niedermann et al., 2014).

A second major market for wearables is healthcare. Hein Daanen, professor of Fashion and Technology at the Amsterdam Fashion Institute, has developed a measuring Knee Brace with sensors for wireless feedback on movement and automatic self-calibration, a Runalyser with sensors for wireless feedback on gait analysis and walking and running techniques, and a Smart Shirt that allows for 3D monitoring of the human trunk to improve posture (Daanen and Ter Haar, 2013; McLellan et al., 2013). New developments in microbiology and nanotechnology have opened up new applications for smart materials in healthcare and beauty care. Think for instance of the antibacterial qualities of cleaning cloths or a mattress – but researchers also experiment with smart materials that can have vitamins, sun creams or deodorant embedded into the fabric itself (Quinn, 2010).

A third possible market for wearable technology is communications, involving the integration of mobile technology into the clothes. This may be the fastest-moving area in the field of wearables, and perhaps also the 'coolest' one. Take for example the 'Twitdress' that singer Imogen Heap donned for the Grammy Awards in 2010. This dress had a big flashing collar and a transparent bag that functioned as a television screen. The digital collar showed real-time tweets from her fans that were transmitted through a wireless router in her dress. In her handbag was an iPhone with pictures that she was being sent online. The wearable technology allowed the singer to be in constant contact with her fans and communicate with them. In order to perpetually collect, process and exchange data, wearables like the Twitdress should be able to generate and preserve its own energy. Researchers aim to integrate wireless systems into the fibre, yarn or fabric, thus allowing the piece of clothing to become interactive. While there are promising developments, as the discussion of Pauline van Dongen's 'Wearable Solar Dress' will show, there remain practical problems like washing or day-to-day wear and tear.

Remarkably, *fashion* is seldom mentioned as a possible market for wearables. This goes to show that the field of wearables is still dominated by a strong push from technology and little or no pull from fashion. However, wearables will never make it commercially if the prototypes are not translated into an aesthetics of fashion. It is for that reason that fashion designer Pauline van Dongen worked on a prototype for a knitted cardigan called 'Vigour', designed by Martijn ten Bhömer as a tool that enables geriatric patients, physiotherapists, doctors and family to gain more insight into the exercises and progress of a rehabilitation process. Van Dongen made the cardigan with integrated stretch sensor monitors more comfortable to wear and more aesthetically pleasing. The point of fashionable technology, after all, is to merge fashion with technology in such a way that it becomes wearable and fashionable at the same time. If we take the term 'wearable technology' on its own merits, it is rather obvious that it should be precisely that: wearable. In other words, it should be comfortable to wear on the body like any piece of clothing. Moreover, the term 'fashionable technology' suggests that fashion and technology should blend together, turning geeky or nerdy garments fashionable.

While the future of fashionable technology has been announced time and again (Quinn, 2002; Seymour, 2009), the praxis, however, lags behind. Wearables rarely leave the lab or catwalk and have not yet conquered the street in spite of many prophecies (Smelik, 2012). This is partly because the innovation of wearable technology needs to be connected more to the aesthetic value of fashion than is the case now. Wearable technology is mostly still in an experimental phase, allowing fashion designers to use and apply new



131. Aynouk Tan wearing an 'emotional catsuit'.

materials and technologies, but this has been the case for decades without its ever making it to the shops or streets. The main exception is some success of integrating smart materials and new technologies in sports clothing and sports shoes. Generally, there are practical reasons for the lack of success of wearable technology: for example, how to wash fabrics with embedded LEDs, solar fibres or batteries? Then there is the issue of comfort: some of the materials, fabrics or outfits are not particularly 'wearable'. When Dutch model and fashion journalist Aynouk Tan tried out a trial version of Philips' 'skin probe dress' mentioned above, she loved it, but complained about the electrodes sticking into her skin (Tan, 2009).

There are also more profound cultural reasons why wearable technology has not been that successful.[3] In the first place, wearable technology often only focuses on functionality, ignoring the social or cultural value of the new technology (Pakhchyan, 2008). Yet, for successful innovation it is more important to look for added value in the form of social interaction and cultural practices. As Ann Balsamo argues, any technological innovation is a 'work of cultural reproduction' (2011: 6) and the 'outcome of social interactions' (ibid.: 11). A design should add value to its functionality; otherwise it remains forever in the realm of mere gadgetry. A garment that charges my mobile phone remains functional, but if it allows me to communicate with others it brings me into a social network, and if it gives me information about the energy levels of my body it can enter a cultural practice of health and fitness. In other words, for fashionable technology to become socially successful and commercially viable, it should involve a process of meaning-making.

Secondly, many wearables are not fashionable enough because the aesthetics of the design is not integrated in the technology. Too often they remain a gadget without taking into account the wearer's body or identity or adding to the quality of life. Comfort, beauty and fashionability should also be part of the design. Thirdly, as the body of the wearer will itself become a form of interface, it is highly probable that wearable technology will blur the boundaries between computer and body. The notion of fashionable technology suggests that bodies are enhanced by the garment, thus increasingly becoming a platform for sensitive and interactive technology. As Fortunati et al. argue, 'the main battleground between the forces of culture and technology is becoming the human body' (2008: 216). On the one hand, cultural fears of technology getting intimately connected to the human body may hamper the further implementation of wearables. On the other hand, an uncritical embracement of technology may obscure ethical issues of privacy or sustainability. In my view, fashionable technology produces cyborg-like figures that will inevitably shift the notion of our own body and identity (Smelik, 2012). The development of cybercouture therefore calls for a renewed and critical understanding of the relation between technology, the body and identity.

Body and Identity

Smart materials and smart garments can be understood as protecting the body or extending its physical functions. Although cultural anthropology claims that clothes function first and foremost as decoration and adornment, clothes are also an extension of the skin, protecting it against nature and society (see for instance Flügel, 1950). Within a context of technology this idea derives from media guru Marshall McLuhan (2002 [1964]: 129-30). In the beginning of the 1960s he suggested that all technology is in fact an extension of the human body. We have now entered an age in which technology is not only a bodily extension, but also a physical improvement, enhancement and expression. We use technology with the idea that we can control, improve and enhance both our lives and our own bodies. By wearing it directly on our bodies, we relate intimately to technical objects and materials. As Lucy Dunne writes, 'Through technology, garments are now

becoming dynamic, responsive, and aware; thus, they are better able to express our individuality and meet our needs and wants' (2011: 616). Integrating technology into our clothes will therefore have an impact on how we experience our bodies and our selves.

Dressing happens literally on the body, and fashion is thus an important way of performing identity in its many facets. As Joanne Entwistle and Elizabeth Wilson (2003) argue, the body is not so much a submissive object to be draped in accordance with the dictates of the social or cultural field, but dressing is rather an active embodied practice. The body, then, is not a given, but something we can put in shape or dress up for what I call a 'performance of identity' (Smelik, 2011). The bodily practice of dressing is an important factor in constructing one's identity. The idea that one 'performs' rather than 'is' one's identity, refers to a constructivist notion of identity: rather than an unchanging essence, identity is a social and cultural construction that slowly transforms over time. As Kelly reminds us, '*Homo sapiens* is a tendency, not an entity' (2010: 128). Identity should thus be understood as a process of continuous becoming: not rigid and fixed from cradle to grave, but fluid and flexible throughout life (Smelik, 2016: 167). Becoming is taken here as a practice of change in the way that philosopher Gilles Deleuze and psychoanalyst Félix Guattari approached it. The continuous process of creative transformations is what Deleuze and Guattari (1987) understand by 'becoming'. One does not just become, but one always becomes something else; life is thus a process of 'becoming-other'.

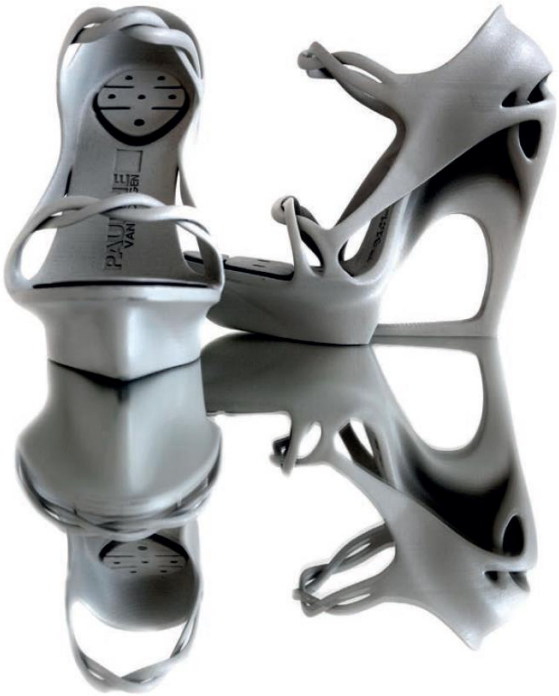
In the context of this chapter, identity can be likened to the performance of a constant dress rehearsal. Or, to put it differently: our identity is 'wearable'. Technology is indeed one of the major factors in affecting our identity and changing the relation to our own body, and wearable technology even more so because of its closeness to the body. This is not entirely new, because human beings have always been intimately connected to technology. The scientist who launched the term 'cyborg' in 1960, Manfred Clynes, says: '*Homo sapiens*, when he puts on a pair of glasses, *has* already changed' (in Gray, 1995: 49, original emphasis). If this is the case for normal glasses, just imagine how the human body and identity change with Google glasses; the new 'geek chic' (Quinn, 2002: 97) that Diane von Furstenberg brought to fashion in 2012. A few decades after Clynes coined the term 'cyborg', the philosopher of science Donna Haraway launched the idea of the cyborg as a figure that typically embodies fluid identity, because it has 'made thoroughly ambiguous the difference between natural and artificial, mind and body, self-developing and externally designed, and many other distinctions that used to apply to organisms and machines' (1991 [1985]: 152). This is particularly relevant for wearables, because they shift and push the boundaries between body and technology. As Fortunati et al. argue, 'the body continually abolishes the border between nature and technology by converting one into the other' (2008: 216). Understanding identity as a bodily practice that is performed time and again, fashionable technology offers alternative and new ways of transforming identities. Exploring the wearer's corporeal and sensorial boundaries, fashionable technologies enable the body to perform identity in and through smart clothes. In my view, therefore, cybercouture extends the possibilities and functions of fashion as an embodied performance of identity.

Today, some avant-garde designers experiment with the ways in which we can shape our bodies or perform our identities beyond our wildest dreams. They seem to have taken Haraway's plea at heart; an appeal 'for *pleasure* in the confusion of boundaries' (1991 [1985]: 150; original emphasis). In the next part of this chapter I further explore the work of Pauline van Dongen, Iris van Herpen and Bart Hess, whose futuristic designs blur the boundaries between art, fashion and technology. They not only share a sculptural, technological and artisanal approach to clothes, but also a fascination for stretching the form and shape of the human body and playing with human identity.

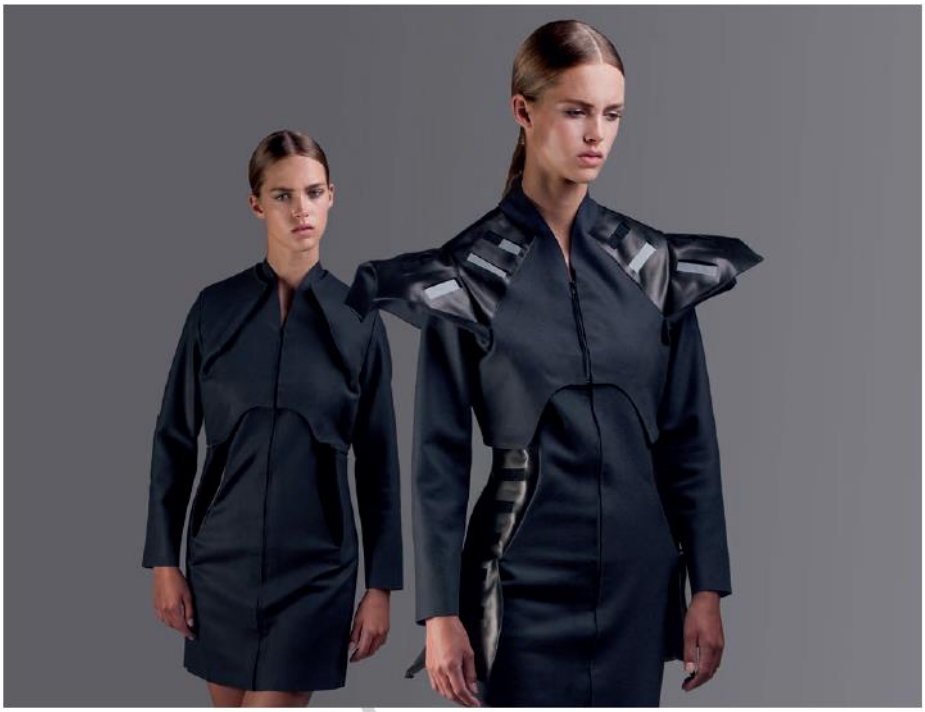
Pauline van Dongen: Morphogenesis and Solar Dress

For her graduation at the ArtEZ Fashion Academy in Arnhem in 2010, Pauline van Dongen created a futuristic shoe, 'Morphogenesis', that was designed and manufactured with a 3D printer.[4] It was then still a new technology in the fashion world, which received a lot of media interest. The particular design of the 'Morphogenesis' shoe was sponsored by the Amsterdam design studio 'Freedom of Creation' that is completely dedicated to the technology of 3D printing, also known as rapid prototyping. The result was so successful that van Dongen received various awards for her shoe. It was the intention to take it into production, but she ran up against the limits of the technology: the choice of materials was then quite limited and the polyamide material was too hard and inflexible for a wearable shoe and it was still a too expensive technique to take into commercial production.

The interesting point of 3D printing is that the entire design process takes place in the computer, without using a mould, prototype or moulage on a tailor's dummy. The virtual design is directly transferred from the computer and printed as a three-dimensional object, which can be made of plastic, metal, ceramic and even glass. The technique of 3D printing opens up new possibilities of designing shapes that are impossible to create by hand. Van Dongen was thus able to discover new



132. Pauline van Dongen, Shoe 'Morphogenesis' (2010).



133. Pauline van Dongen, 'Wearable Solar Dress' (2013).

spatial forms and repetition of structures for the design of the shoe 'Morphogenesis', as the inimitably intertwined loops in the heel show. The technology enables an architectural approach to design, which she now applies to clothes.

Van Dongen believes that wearable technology should move beyond mere gadgetry, by integrating the technology into the clothes to give it a social or communicative function. Pauline van Dongen conducts a meticulous research on the behaviour of experimental and hi-tech materials, combining new technologies with traditional techniques to constantly renovate the practice of craftsmanship. Above all, she is interested in how to make her sculptural and artistic design wearable by combining technology with industrious workmanship. Paradoxically, then, the example of van Dongen shows that technological innovation in the field of cybercouture is sustained by craftsmanship and workmanship.

Working closely with companies from the field of science and innovation, especially small firms such as Solar Fiber, Elitac, Inntex and Xsens, van Dongen also seeks to integrate solar energy or hardware into the fabrics and clothes. The integration of different expertise has been fundamental for the realisation of projects such as 'Wearable Solar Dress' (2013), an example of wearable technology that integrates solar cells into garments. The project again stimulated a lot of media interest; van Dongen was asked to explain on many a

Dutch television show how the body can become a source of energy by exposing the garment to sunlight for two hours so as to, for example, charge your smartphone. The Wearable Solar Dresses thus feature not only fashionable, but also sustainable technology.

The 'Wearable Solar' dresses contain solar cell modules that are made of flexible thin-film solar cells. As the cells cannot be stitched, Van Dongen worked with leather to create slits in a pre-defined grid, creating pockets for the thin films that are connected on the inside with thin electrical wires. This technology inspired the aesthetics of the dresses: by noticing the layered construction of the solar cells, she then created a layered garment, where the solar cells are placed in modular compartments that can be unfolded to reveal them to light or worn invisibly when they are not needed (Smelik, Toussaint, van Dongen, 2016).

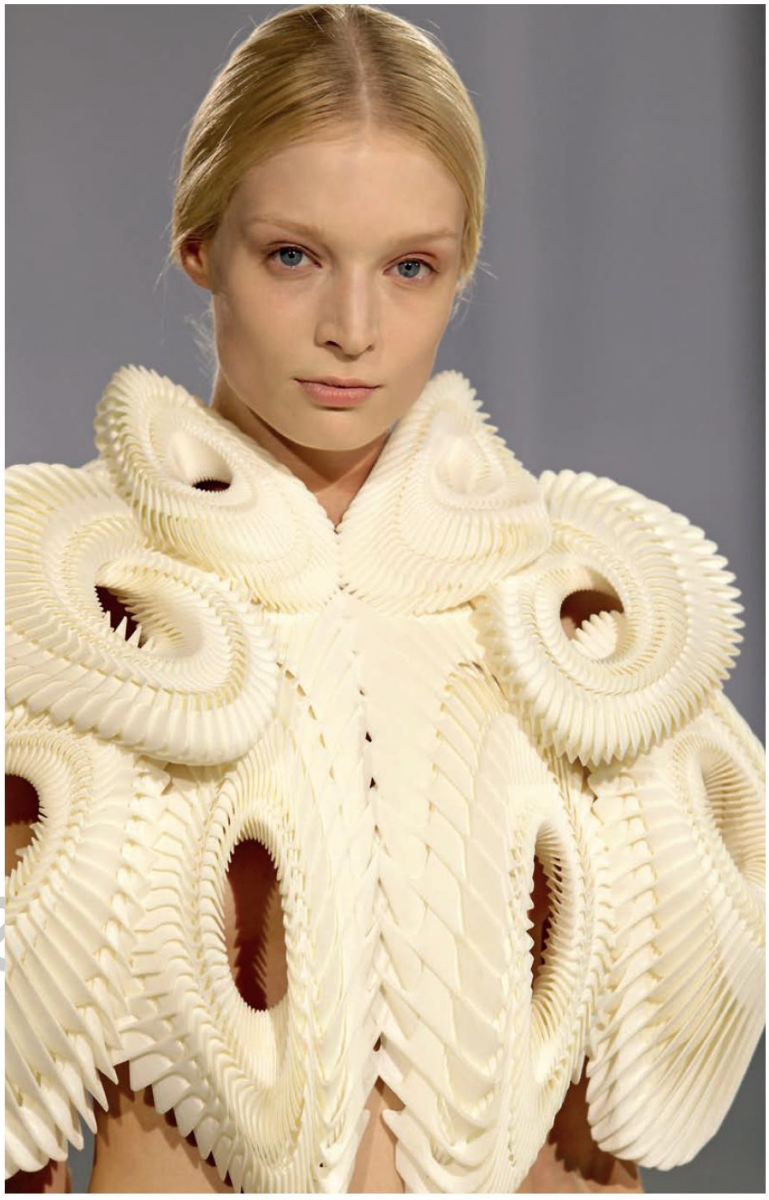
As becomes clear from these examples, Pauline van Dongen's collections create an aesthetics of technology. Her cybercouture refers to what I have called elsewhere a 'becoming-machine' (Smelik, 2016). Deleuze and Guattari introduced this term to indicate a new process of becoming (1987 [1980]). The abstract fluid volume and hyperbolic surfaces of van Dongen's collections 'Kinetic Landscapes' (S/S 2012) and 'Oloid' (S/S 2014), for example, show the possibilities of transforming the human body. Her designs of fashionable technology invite a reflection on new forms of embodiment. The becoming-machine of such fashion designs suggests a dynamic engagement with the technology that surrounds us and vice versa.

Iris van Herpen: Form Follows Emotion

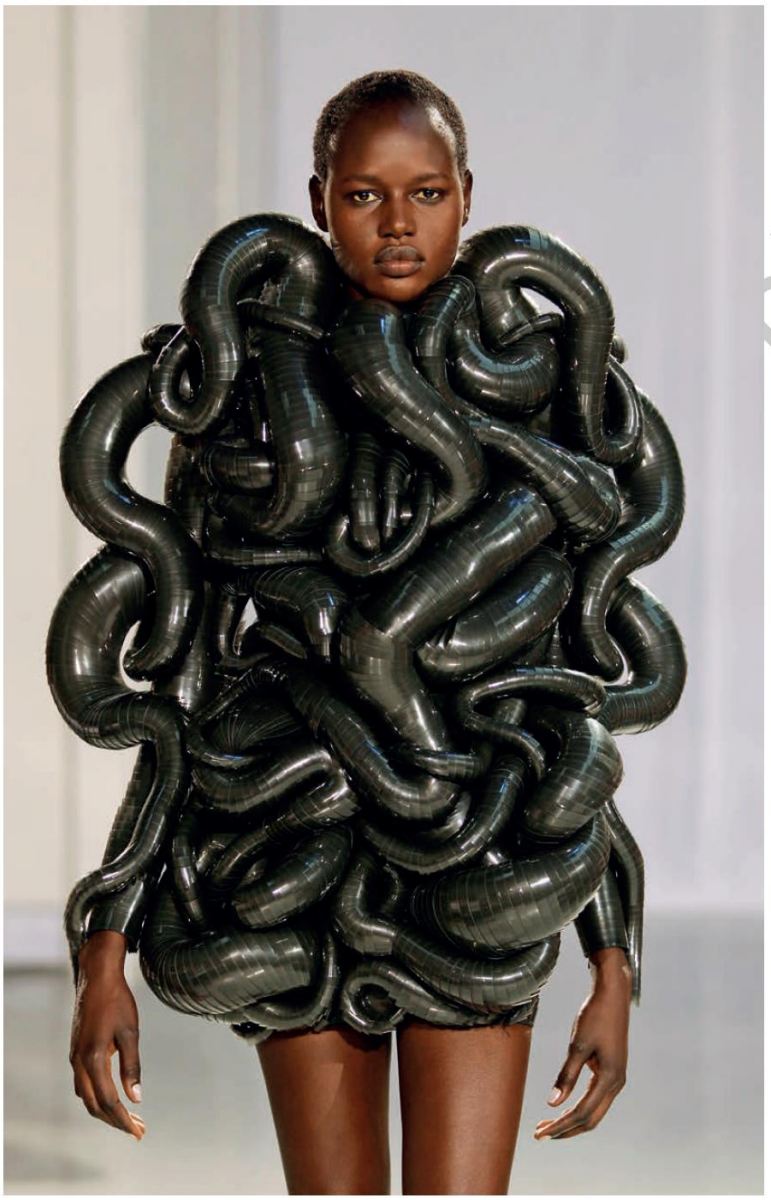
Also a graduate from ArtEZ Fashion Academy in Arnhem, Iris van Herpen has made it to the international platform of high fashion since she was invited to show her collections in Paris as of 2011, as a guest member of the Parisian Chambre Syndicale de la Haute Couture. In 2014, she received the prestigious ANDAM Award that included a year's training under François-Henri Pinault and in 2016 she received a big Dutch award, the Fashion Stipendium from the Prins Bernhard Fund for Culture.

Iris van Herpen's fashion designs are hailed as 'futuristic, sculptural and experimental', in the words of fashion curator Ninke Bloemberg for an exhibition of her work in the Central Museum in Utrecht in 2011 and in the Groninger Museum in 2012 (Bloemberg, 2011: 7). Perhaps no wonder that none other than Lady Gaga and Björk have been spotted in van Herpen's designs. Van Herpen herself refers to her designs as 'organic futurism' because they are characterised by new technologies as well as by detailed handwork (Bloemberg, 2011: 13). Bloemberg describes the designs as 'avatar-like' (2011: 7), and indeed most designs seem to find their inspiration in a science-fiction or fantasy world that is closely related to science and technology.

To understand the special and often alien designs of van Herpen, the term 'becoming' in its sense of becoming-other can help (Smelik, 2016).[5] Throughout her collections, the 3D printed designs seem to be made of wafts of smoke, falls of water, rings of twisted leaves, or folds of bones. In a unique play of endless loops, folds, waves, bends, curls, wrinkles and circles, baroque shapes open and close. Forms undulate and fluctuate. Materials ripple, waver and swing. Van Herpen's sensitive visual language is not captured in traditional flowing fabrics like silk, satin, tulle or organza, but in hard materials such as leather, metal, plastic, synthetic polyesters and hi-tech fabrics. She



134. Iris van Herpen, 'Capriole' (A/W 2011).



135. Iris van Herpen, 'Capriole' (A/W 2011).

succeeds in catching a wave of water in an intangible form, a becoming-water in 'Crystallization' (2011), or a becoming-smoke in a design from the collection 'Refinery Smoke' (2008). Dressed in van Herpen's designs, the models cross the boundaries of what a body can look like and become in-between characters: between humans and animals in 'Fragile Futurity' (2008), between mummy and doll in 'Mummification' (2009), between skeleton and body in 'Capriole' (2011), between man and cyborg in 'Chemical Crow' (2008), between the virtual and material in 'Escapism' (2011) and between organic and artificial in 'Hybrid Holism' (2012) or 'Wilderness Embodied' (2013). In 'Biopiracy' (2014) the models are caught in things that look like spiders' webs. In her latest collections van Herpen pursues her signature in combining 3D-printing patterns with hand-woven textiles mixed with unlikely materials such as steel. 'Magnetic Motion' (S/S 2015) was inspired by the power of magnetic fields that she discovered during her stay as artist-in-residence at the European Organization for Nuclear Research CERN. As she did for 'Hacking Infinity' (A/W 2015–16), she worked together with artists and architects to create a fractal look that fuses nature and technology.

Van Herpen's designs come across as futuristic, morphing new silhouettes, inviting the wearer to inhabit the freedom of co-creating the body into new shapes. In her experiment with form and matter she calls for a different relation to the, mostly female, body. As van Herpen says:

> I just do not subscribe to the slogan 'Form follows function'. Instead, I look for shapes that complement and change the body and thus the emotion. Movement, so essential to and in the body, is just as important in my work. (Van Herpen quoted in Bloemberg, 2011: 11)

Looking at any one of her innovative designs one can see how the human body is invited to become dynamic, opening up to a multiplicity of lines, notches, gaps, holes and fissures.

Van Herpen's style does not only derive from her talent and imagination, but is also made possible by new technologies. She is always on the lookout for new forms, materials and techniques, with which she then experiments in her studio (Bloemberg, 2011: 13). Her work is thus an example of the blurring of boundaries between fashion and technology, or as Ava Chin writes: 'Indeed, technology *is* the fashion' (2010: 35, original emphasis). As we read above, 3D design and printing has brought about a revolution in design practice, opening up possibilities of creating new forms which would have been impossible when designing by hand on a flat sheet. Yet, importantly, as for Pauline van Dongen – and Bart Hess, as we shall see below – craftsmanship remains important to van Herpen's work. Each garment, however much technologically designed and manufactured, is finished with the finest detail by hand. In other words, the fusion between technology and craftsmanship is paramount. As Iris van Herpen comments:

> The combination of craftsmanship and new technology is crucial for me, because it gives a tension between the possibilities of technology and the redundancy of traditional techniques. I do not want to resolve this tension by only designing clothes in a high-tech way, but I sustain the tension by giving ample space to manual workmanship. (Van Herpen quoted in Bloemberg, 2011: 11)

More recently, she claims that she is 'still searching for a way to fill the gap between the computer process and the traditional craftsmanship that is done by hand' (Lampe 2015: 36). For her, science, technology and craftsmanship should come together into a fusion where they can enhance one another.

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Looking at any one of her innovative designs one can see how the human body is invited to become dynamic, opening up to a multiplicity of lines, notches, gaps, holes and fissures.

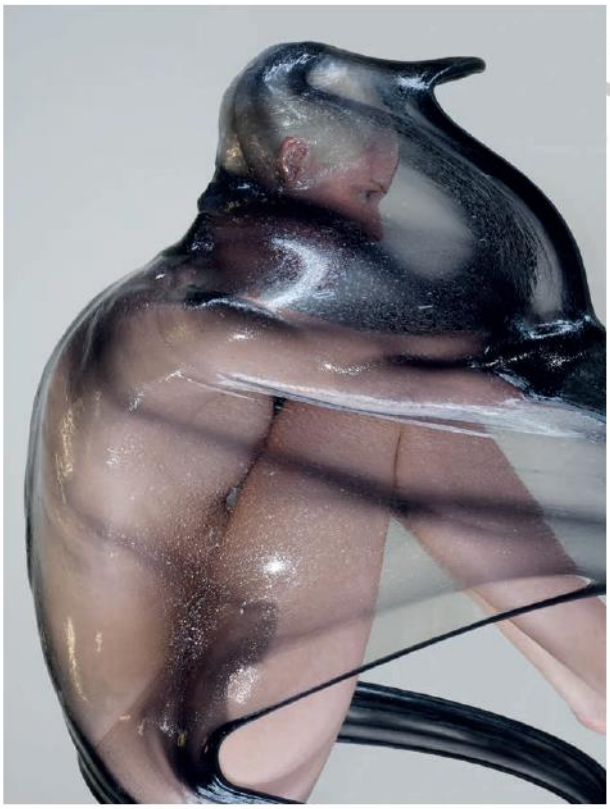
Van Herpen's style does not only derive from her talent and imagination, but is also made possible by new technologies. She is always on the lookout for new forms, materials and techniques, with which she then experiments in her studio (Bloemberg, 2011: 13). Her work is thus an example of the blurring of boundaries between fashion and technology, or as Ava Chin writes: 'Indeed, technology *is* the fashion' (2010: 35, original emphasis). As we read above, 3D design and printing has brought about a revolution in design practice, opening up possibilities of creating new forms which would have been impossible when designing by hand on a flat sheet. Yet, importantly, as for Pauline van Dongen – and Bart Hess, as we shall see below – craftsmanship remains important to van Herpen's work. Each garment, however much technologically designed and manufactured, is finished with the finest detail by hand. In other words, the fusion between technology and craftsmanship is paramount. As Iris van Herpen comments:

> The combination of craftsmanship and new technology is crucial for me, because it gives a tension between the possibilities of technology and the redundancy of traditional techniques. I do not want to resolve this tension by only designing clothes in a high-tech way, but I sustain the tension by giving ample space to manual workmanship. (Van Herpen quoted in Bloemberg, 2011: 11)

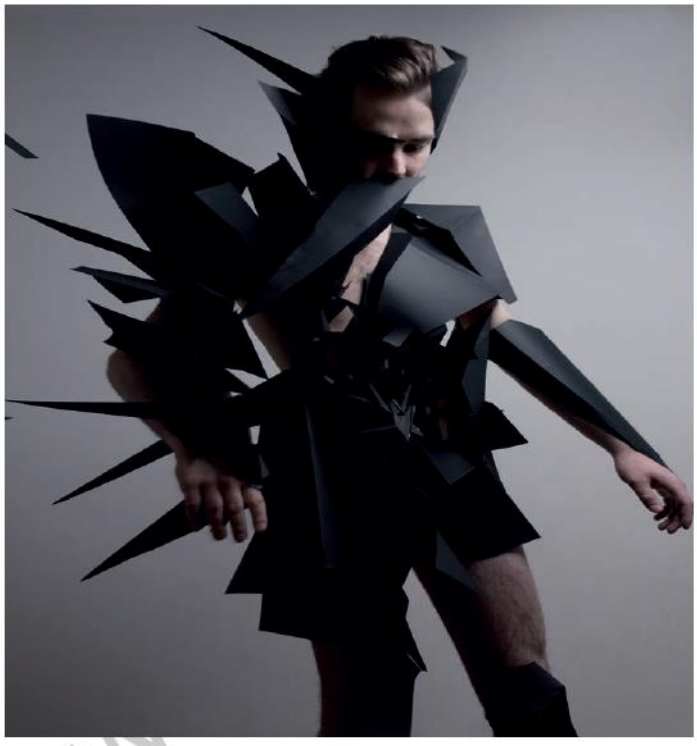
More recently, she claims that she is 'still searching for a way to fill the gap between the computer process and the traditional craftsmanship that is done by hand' (Lampe 2015: 36). For her, science, technology and craftsmanship should come together into a fusion where they can enhance one another.

Bart Hess: Organic High-Tech

As a graduate from the Design Academy in Eindhoven, Bart Hess is perhaps more of an artist than a fashion designer, although he has made textiles, photographs and animations for American *Vogue*, and for fashion designers Walter van Beirendonck (with whom he did an internship in 2006), Iris van Herpen (2011) and Thierry Mugler (S/S 2013). With his fascination for manipulating the human body, Hess pushes the boundaries of textile design by extending the materials through other media such as film, photography and animation. His futuristic materials blur the boundary between textile and skin. He has dressed the naked, often male, body not so much in clothes, but in a range of textures including toothpicks, shaving foam, grass, pins and needles, earth, shards of plastic and even slime. To create the latter he mixes hundreds of small pots of slime, which he purchases in children's toy shops, with latex, paint and other materials. Hess then pours the coloured slime over a model in the studio or during live performances. While the model stands dripping for ten or fifteen minutes, Hess takes pictures or makes



136. Bart Hess, 'Slime' (2010).



137. LucyandBart, 'Exploded View 2' (2010).

videos of the slow slimy process. One of the more famous designs is his 'Slime Outfit' for Lady Gaga's album *Born This Way* (2010).

Here we find an image that expresses perfectly, if not literally, the becoming of an identity in flux. This is a human body dressed almost beyond recognition; a body without a pre-ordained meaning or function. As the slime drips down, the body reveals its constant state of flux, of transformation, of becoming.

Slime is not particularly technological, but I have used the example here to show how art can push the boundaries of what a body can become, unleashing normative ideas of what a body should look like. Bart Hess has also produced many high-tech images of cyborg-like figures, for example in his projects 'Pins and Needles' (2014), where he adorns the body in pins, studs and needles, 'Echo', where he dresses the body in liquid glass (2011) or 'Mutants' where he clothes the body in latex (2011). Like the work of Iris van Herpen, his work is often referred to as 'futuristic'.

In the exhibition *A Hunt for High Tech* (2013) the Rijksmuseum Twente in Enschede showed a collection of such futuristic designs by Bart Hess. The collection of photography, animations and live performances shows conceptual textiles that blur the boundaries between nature and technology in an effort to create new

'wearables' in this case are not really wearable, because they are often made of materials that are temporarily glued to or poured over the human body, but they do explore the corporeal and sensorial boundaries of the human body. What strikes the viewer is the suggestion of tactile qualities; it takes a moment to realise you are not looking at hair, fur or scales, but at a range of strange materials such as foam, balloons, needles or toothpicks. As in the case of the textiles that Bart Hess created for Iris van Herpen, they show the vast amount of handicraft that is implicated in his work.

Despite the futuristic appearance of many of his works, there is, in fact, very little technology involved. He has created many images through traditional craftsmanship and basic photographic and video-editing techniques. The outlandish forms that he creates are based on painstaking manual labour, while the textures often suggest the possibility of organic growth in a hi-tech lab. The paradoxical effect is that he thus points to the *im*possibility of such lab-grown materials. Like in his earlier work with Lucy McRae, as the duo LucyandBart that I mentioned above, Bart Hess alters the appearance of the human body or the human face into fascinating forms beyond recognition. Again, the notion of 'becoming-other' of Deleuze and Guattari (1987 [1980]) comes to mind: becoming-animal, becoming-cyborg, becoming-alien, becoming-fluid.

To begin with, Pauline van Dongen, Iris van Herpen and Bart Hess share an intense love for craftsmanship; each of them likes to engage hands-on with the materiality of textiles and textures. In my view, the renewed focus on craftsmanship is intimately connected to the technological world we live in. As Richard Sennett writes, 'technical understanding develops through the powers of imagination' (2008: 10). The qualities that are imbibed in craftsmanship bring the technologies within the grip of our hands, making the hi-tech world more human and accessible. Where for Sennett it seems to be impossible or utopian for craftsmen to work with the machines productively (2008: 118), the Dutch designers are keen to combine craftsmanship with technology; it is not a question of one excluding the other – they go hand in hand. Here we can hark back to the original Greek meaning of the word *techne*: art, skill, craft. The focus on craftsmanship betrays a new interest in the materiality of matter in a hi-tech world of virtual technologies (Barrett and Bolt, 2012). While van Dongen, van Herpen and Hess focus first and foremost on the materiality of textiles, as fashion designers they are also interested in the materiality of the human skin and body. Moreover, they extend their fascination for matter and materiality to the technologies that they use; they have developed what Sennett calls a 'material consciousness' (2008: 119).

I draw attention to the issue of materiality, because matter is precarious in an age of digital and virtual technologies (Coole and Frost, 2010; Bennett and Joyce, 2010).[6] The notion of materiality allows us to focus on the actual matter of technology and how our – material

– bodies relate, often intimately, to the technical objects that enhance our clothes and our selves. There is no doubt that technological innovations will have a deep impact on the meaning and communication of clothes and fashion. If technologically enhanced clothes can measure temperatures, chemical processes or vital functions, sense movement and position, or have expressive qualities, they will change the relation of the wearers to themselves as well as transform the communication to and with others. The fact that the garments are worn on the body increases the urgency to take into account the body's materiality. Perhaps fashionable technology can develop ways of integrating the body's tactility and sensitivity into the design. This is where I think the futuristic designs of van Dongen, van Herpen and Hess can help us to shape and change our identities differently.

Moving in between art, fashion and technology, Pauline van Dongen, Iris van Herpen and Bart Hess experiment with the ways in which we can shape our bodies or perform our identities. Clearly, they move us out of our comfort zone or our wardrobes into a fantasy world, where they take pleasure in confusing boundaries between human and cyborg, or human and animal, but also shift ambiguous borders between skin and textile, organic and technological, material and digital. Their cybercouture shares a futuristic outlook, opening up a horizon beyond conventional fashion. In their shared fascination for stretching the boundaries of the human body, they tempt the viewer or wearer to put his/her identity at play. As I argued in this chapter, this play with identity can be understood – following Deleuze and Guattari – as a process of 'becoming'. As Kelly writes, 'we are nothing more and nothing less than an evolutionary ordained becoming' (2010: 128). In his view technology is part and parcel of that open-ended process. The three Dutch designers that I discussed in this chapter ask us to engage affectively with the fusion of art, fashion and wearable technology, embarking on the transformative process of becoming. The strange shapes, forms, textiles and materials invite a reflection on new forms of both embodiment and human identity. By reshaping the human body beyond its finite contours, cybercouture offers an encounter between fashion and technology, opening up to a future world where garments are merged with human skin, body and identity.

Notes

1. I thank Lianne Toussaint for her valuable input in this paragraph.

2. Personal communication with professor Hein Daanen, June 2014.

3. In this context it may be interesting to mention that I am currently (2013–2018) running a research project on fashionable technology at the Radboud University Nijmegen, together with the Technical University Eindhoven (Oscar Tómicó Placencia) and the ArtEZ Fashion Academy Arnhem (José Teunissen), financially supported by the Netherlands Organisation for Scientific Research. The interdisciplinary research project is called *Crafting Wearables* and aims at designing wearables that are robust, fashionable as well as commercially viable within the production chain. It brings together the different fields of fashion, technology, industry and academic scholarship, by working with the following private and public partners: Philips Research, Textile Museum Tilburg, MODINT, Freedom of Creation, Solar Fiber, Inntex, and Xsens. The two PhDs are Pauline van Dongen as designer and Lianne Toussaint for the social-cultural perspective. See for more information: www.craftingwearables.com.

4. The information for this section is based on several conversations with Pauline van Dongen between 2011 and 2015.

5. In the article 'Gilles Deleuze: Bodies-without-Organs in the Folds of Fashion' I have analysed the work of Iris van Herpen and Bart Hess more systematically with several of Deleuze's concepts (Smelik, 2016).

6. In the 'Introduction' to *Thinking Through Fashion*, Agnès Rocamora and I have elaborated on the use of theories of materialism for fashion studies (Rocamora and Smelik, 2016).

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