

Springer Series in Design and Innovation 38

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For Nature/With Nature: New Sustainable Design Scenarios

 Springer

Springer Series in Design and Innovation


Volume 38

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For Nature/With Nature: New Sustainable Design Scenarios

 Springer

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Aversa, Italy

ISSN 2661-8184

ISSN 2661-8192 (electronic)

Springer Series in Design and Innovation

ISBN 978-3-031-53121-7

ISBN 978-3-031-53122-4 (eBook)

<https://doi.org/10.1007/978-3-031-53122-4>

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Centring and Decentring the Human: New Alliances with Nature and Technology in Fashion Materials



Giovanni Maria Conti  and Paolo Franzo 

Abstract This contribution investigates two major perspectives that characterise the fashion industry in the twenty-first century and the relationship between humans, nature and technology. The first perspective has to do with the centring of humans and their needs in design, in a systemic and holistic way, leading to the evolution of Industry 4.0 into 5.0; the other perspective is an awareness of the limits of an anthropocentric vision and the need to look beyond the human in search of collaborations with the non-human, nature and technology. Through a literature review and a discussion of some case studies, this contribution explores these two perspectives and their interrelationships. These two trajectories are not alternatives, however, but instead intertwine, thus bringing to the attention of contemporary fashion design an ecosystem composed of humans, plants, animals and technologies.

Keywords Human-centred design · Decentring human · Fashion ecosystems · Fashion textiles · Biomaterials

1 Introduction¹

For many years, the fashion industry has been at the centre of the debate around the lack of sustainability in its processes and its negative impact on the environment and people. Reflections on the urgency to reduce its ecological footprint, to slow down

¹ The authors shared the approach of the text and jointly wrote 1. *Introduction* and 6. *Conclusions*. The paragraphs 2. *Centring the Human* and 3. *From 4.0 to 5.0: The Case Study of The Textile Company Botto Giuseppe* were written by Giovanni Maria Conti. The paragraphs 4. *Decentring the Human* and 5. *Nature as Fashion Materials* were written by Paolo Franzo.

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its pace, and to decrease its levels of resource consumption have intensified (Fletcher 2010; Tham 2012). Recently, however, the idea has emerged that it would be useful to question not how fashion can reduce its impact, but how it can transform itself into an active and positive force with the use of digital technologies, encouraging a new relationship between humans and nature.

This article aims to answer the question recently posed by Ezio Manzini (2022): “Could fashion objects become agents for positive change, to reweave the web of life which, in recent years, we have so recklessly torn apart?”. This question can be approached from two apparently contrasting, but actually deeply related approaches that characterise fashion design in the twenty-first century: on the one hand, we position humans in the centre of fashion design and reaffirm the value of the human-centred approach in its connections with the technological dimension; on the other hand, we decentralise humans in search of new forms of collaboration with non-humans, including nature. It is a constant process of centralisation and decentralisation in search of new fashion ecosystems capable of sustaining the future (Fry 2008; Conti and Franzo 2020). This contribution explores these two perspectives and their interrelationships through a literature review and the analysis of some case studies. The in-depth investigation of the human-centred approach is carried out through the analysis of a case study—the Botto Giuseppe textile company—using a semi-structured individual interview as a method to understand the transitions of the company’s processes; the human decentralisation, on the other hand, represents a more recent and less structured phenomenon than the previous one and is therefore investigated by carrying out the analysis of a number of case studies which allows us to understand its characteristics and methodologies.

2 Centring the Human

Today, the avant-garde would have a value of restoration rather than revolution, a more positive and open visionary than that which, in its exploration of the abyss and the mysterious, was characteristic of the first part of the twentieth century (Pellegrini 2017: 15). We live in an era where changes in our living conditions are part of our agenda; everything we know, or think we know, is questioned, leading us to a necessary reflection: what are the values we transmit through what we design? What is the role of the designer in an ever-changing context? If it is true that the designer makes things (Schön 1984), in reality what we think of our near future needs to be reviewed (Badalucco and Cristofoli Ghirardello 2020: 23), without however knowing which of two possible paths we will take: that of an increased focus on our economic-productive dynamics or that of understanding—or rather accepting—what the elements of unsustainability of the current system are in order to proceed along a change of direction that leads to new models of production and consumption.

In an industry such as fashion, which by its nature is transitory, because it exists in a continuous and repeated present, change is vital and always takes on new meanings; too often the study of dress and fashion has been undertaken with a simple iconic

approach, limited to a purely aesthetic discourse between the creator and the user (Conti 2018). In this way the analysis and consequent reading result in fashion appearing decontextualized from the mechanisms that induce its ideation, production, and consumption (Conti and Motta 2014, Conti 2022). The common concept of fashion is still centered on unrestrained consumption, beauty, luxury, elegance, and distinction: a sort of “magic world”, considered by many to be ephemeral, in which “image” is the only fundamental element.

In this context, more and more debates and new considerations are emerging on the role of the fashion designer in a context in which the product is increasingly obscured by systems and services that have the task of modifying, enhancing, redefining the meaning of the product itself. Design is entrusted with a central role, not only referring to the design of individual product systems, but also to the construction of new narration and communication systems, to the identification of new business models or to the recovery—in a renewed key—of methods of production and consumption that are no longer in use (Badalucco and Cristofoli Ghirardello 2020: 24).

The production model called “factory 4.0” based its organization on the presence of cyber-physical systems whose purpose was to integrate the physical and digital worlds through the development of machines capable of communicating independently; they are connected to IoT (Internet of things) systems applied to products and processes capable of providing information about themselves. Technology, connection, big data and machine learning have thus been the key words of the last five years that have changed the context of industrial production, transforming it more and more into something interconnected and automated.

The European Community document on the new industrial vision (European Commission 2022a) questions some of the ways in which it would be necessary to continue to a more transformative view of growth that is focused on human progress and well-being based on reducing and shifting consumption to new forms of sustainable, circular and regenerative economic value creation and equitable prosperity. Thus, the debate shifts from mere technological aspects to a more systemic and holistic view, with the need to reaffirm the centrality of the person and the importance of a human-centred approach (Casarotto and Costa 2020: 82).

3 From 4.0 to 5.0: The Case Study of the Textile Company Botto Giuseppe

The digitalization development has enabled that continuous interconnection—not only between production systems, but increasingly between individuals—which has changed the very everyday life of populations even those distant from each other in terms of history and traditions (Bianchi 2018: 57). Surely, however, the “technological question” that eventually emerges after, perhaps, having tamed the Covid-19 pandemic, is well defined by the document *Industry 5.0: A Transformative Vision for Europe* in which it is reported that Industry 4.0 is a paradigm that is essentially

technological, centered around the emergence of cyber-physical objects, offering a promise of enhanced efficiency through digital connectivity and artificial intelligence (European Commission 2022a: 5). However, the Industry 4.0 paradigm, as currently conceived, is not fit for purpose in a context of climate crisis and planetary emergency, nor does it address deep social tensions. Instead, it is structurally aligned with the optimization of business models and economic thinking that are the root causes of the threats we face today. The current digital economy is a winner-takes-all model that creates technological monopoly and giant wealth inequality.

Therefore, discrepancies emerge between what was the assumption of the European Union and what actually occurred: a model of a digital economy in which technological monopolies have been created, generating gigantic inequalities. Furthermore, there has been a failure to work on a development model that the European Union wanted as “twin transition” (European Commission 2022a: 6), intending to connect digital transformation with sustainability and climate action.

What we are learning from the pandemic is not dissimilar to what we should have learned after the collapse; that, to some, human life doesn’t matter as much as big business does. According to Coco Chanel, “Fashion is in the sky, in the street, fashion has to do with ideas, the way we live, what is happening” (Dieffenbacher 2021: 13), but fashion is also a global industry, one of the most environmentally and socially exploitative.

The fashion industry’s supply chain involves other industries, from agriculture to communication, and nearly one hundred percent of the population wears clothes—meaning that we all have our part to play if we decide that we can become a part of the solution. To update Chanel’s quote to a modern-day scenario, it would read: “Fashion is in the polluted sky, in overcrowded streets, fashion has to do with the people who make our clothes, the way they live, what is happening to our planet”.

In this sense, then, it is necessary to rethink the model of technological and industrial development: according with the Industry 5.0 approach, it requires new economic orientations to industry performance, new design for business models, value chains and supply chains, new purpose for digital transformation, new approaches to policymaking in partnership with business and industry, new capabilities and approaches to research and innovation as well as vertical and horizontal coherence by acting at all levels of government and through international standards (European Commission 2022a: 6). And the most important thing about this new technological and industrial paradigm lies in the need to empower workers through the use of digital devices, endorsing a human-centric approach to technology.

In its specific field, fashion must recover its function to survive and respond first of all to the needs of the public, of the people in real life, and it must do so by abandoning personalism. Extending the life of textile products is the most effective way to significantly reduce their impact on the climate and the environment (European Commission 2022b: 3). For this purpose, product design plays a key role. For the first time, Europe, with the new guidelines for the European textile sector, enters the field of fabrics; and it is no coincidence that the first point of the new development model speaks of “binding eco-design specifications” (European Commission 2022b: 3). Design therefore becomes a strategic activity to accompany

a very important paradigm shift; but it is also the “place” of new design cultures and practices, as well as new ways of understanding the figure of the designer.

Fashion represents a complex system of companies that are heavily involved in this paradigm shift; in the critical research book on sustainability in the fashion sector (Conti 2021: 11), Sandy Black (2012) affirms that “the business of fashion is a complex mix of personal, cultural, economic, and social factors. The words ‘fashion’ and ‘clothing’ donate different aspects of our relationship with what we wear. ‘Clothing’ can be understood as our everyday basic garments, commodities purchased out of necessity; ‘fashion’, on the other hand, represents consumers’ discretionary choices, which can be driven by all manner of personal and symbolic motivations: desire, aesthetics, novelty, conformity”.

The product “purchased out of necessity” is the result of a long value chain in which Italian manufacturing represents excellence worldwide and where much more interesting and relevant to design (Fiorani 2021: 130) is that creativity is based on the ability to problem-solve and wonder. Here, creative processes are characterized by flexibility, i.e. the ability to consider multiple solutions to a problem, fluidity, i.e. the frequency and ease with which multiple ideas are produced, and the elaboration and fine-tuning of an effective strategy in solving a problem by evaluating and choosing the available opportunities. The Italian manufacturing sector represents the excellence of that “beautiful and well-made” which is recognized all over the world. But this characteristic of the Italian product is merely the result of a collective work that Italian companies have always carried out with other companies located in different parts of the world.

The object of consumption is no longer identified with the mere possession of a given product; very often today, the object of consumption is the experience, meant as the self-enhancement that the subject-user can experiment within new environments. This product experience becomes the key with which several Italian companies are dealing. The value of memory, i.e. making the consumer’s experience with the product and its history an integral part of the story, is at the basis of some of the actions undertaken by Botto Giuseppe, an important Italian spinning mill located in the province of Biella, as stated by Silvio Botto, CEO of the company: “Storytelling is an important part of sustainability because it serves to bring the end customer closer to a dimension of the product that until a few years ago was taken for granted. That’s why through brochures and the website we communicate the story of the Australian farms we work with and their sustainable production. In the years before the pandemic, several farm owners came to Italy during the Pitti fairs and explained their production and philosophy with respect to animal husbandry to our customers”.²

Ethics thus becomes the way of living and existing from a place, an element that shares itself with others, and culture is ethical responsibility towards the community and care for the place and that element (Fiorani 2021: 184). Sustainability as contemporary work ethics, traceability as quality certification: “I believe that there can be no true sustainability without traceability, because it is an essential requirement to

² From the interview with Silvio Botto, CEO of the company Botto Giuseppe, conducted via email on 20 January 2023.

give the customer transparency of the entire production cycle, starting from the farm and ending with the finished product. Traceability offers our customers the possibility of gathering exact information on all the components and all the procurement practices of the semi-finished product, through an analysis of the entire supply chain involved”.³

Design is more than just creating a nice product, a fashionable product (Black 2012). Design involves responsibility: you can no longer just use a nice color, spot the right trend and make a new collection. In the words of Sandy Black, designers today cannot only be designers; they have to be something of a philosopher: the consumer will be more educated in the future, so a designer has to convey a message that is true and authentic. Silvio Botto continues: “We started a traceable system as early as 2016, when the first Naturalis Fibra collection was launched, even before certifications such as RWS for wool and SFA for cashmere were born. We identified high quality farms in Australia that could produce significant quantities of superfine wool and that also had important sustainability requirements in terms of both animal welfare and land management. The farms are often owned by the same family for several generations with a focus on quality and a product philosophy similar to ours”.

In this return to the natural and to the material as such and to its grain (Fiorani 2021: 99), there is also the recovery of manual activity and the intelligence of the hand; it is essential not only in artistic work but also in the most sophisticated technologies and above all to the sense of ourselves and our doing and the pleasure of doing it with our hands. “We have a direct relationship with the farms we work with, we visit them every year and plan purchasing programmes with them, in fact the raw wool is then imported by sea and processed in the Romagnano combing plant of which we are partners. Among the most important farms are Congi and Benangaroo owned by the Field family. Michael Field, in the fourth generation, has a vision very much centered on animal welfare, product quality and the search for improved land management, and today his daughter Laura Field has started working in the company and is dealing with sustainability issues”.⁴

Is it then a return to the recovery of emotions as a way for the human mind to solve problems? Claims Donald A. Norman (2004), the emotional system modifies the operative modes of the cognitive system. Emotions are defined as vibrations that slip into the body and provoke curiosity, which, in turn, facilitates learning. What we need now is to rediscover our humanity and the otherness that inhabits us and the relationship with the other that constitutes us and our different souls that unite us to the territory, to other cultures, to the other animal, vegetable, material, machine, network and to the technological and intelligent system that we ourselves have created (Fiorani 2021: 183). Every existence is the incomplete result of continuous mutations and contaminations with the otherness it hosts and from which it is hosted; the limits of an exclusively anthropocentric vision therefore emerge, and faced with the awareness of the local and global repercussions of every behavior comes the call for a new sense of responsibility and participation.

³ Cit. Interview with Silvio Botto.

⁴ Ibid.

4 Decentring the Human

We can observe an increasing focus on humans and their needs in the fashion industry in recent years (Cianfanelli et al. 2022), as seen in the previous paragraphs. However, there is an increasing awareness of the limits to an anthropocentric point of view. One of its first signs was the question posed in 2008 in *Fashion Theory* by Regina A. Root: “What should we wear to save the Earth from ourselves?” (Root 2008: 419), indicating the responsibility of mankind in the environmental and social crisis that characterises the twenty-first century. It also brought up the possibility of fashion becoming a promoter of change and remedying the current situation. This generates the idea that it is necessary to “look beyond the human” and “turn our attention towards flora, fauna, technology, material culture and energy resources” (Vänskä 2018: 17).

From a theoretical point of view, the posthumanist theories developed by Donna Haraway (2016) and Rosi Braidotti (2013, 2019) do not exclude humans, as it might seem from the prefix “post”. They try to reconceptualise the relationship between humans, non-humans, nature, and technology, placing them all together at the centre of attention. Compared to the dominant approach in the current design discourse, which sees design based on the human needs, the emerging inclusion of the needs of non-human beings is considered increasingly more often. As Tarcan et al. (2022) point out, “humans coexist with the rest of the world and are dependent on nonhuman beings, designing for only human needs would be insufficient”. The posthumanist perspective of design, therefore, is characterised by a non-anthropocentric and inclusive vision, in which it facilitates the emergence of relationships between humans and non-humans (Forlano 2017).

The identity of fashion design built around the humans in their bodily presence and their social relations, is questioning what it entails to adopt a posthuman perspective. As Smelik (2020) states, posthuman fashion “pushes the boundary between the human and non-human” and it “blurs the borders between human and machine, humans and animals, and organic and artificial”. This blurring of boundaries should not, however, be understood as a shift towards the cyborg imaginary and a consequent prevalence of the digital and immaterial dimension. In fact, Smelik (2018) proposes to place posthumanism within the theoretical framework of new materialism, a “turn to matter” (Fox and Alldred 2019: 2). According to this theory, everything is made of matter: “things, objects, art, fashion and people [...] are all mixtures of organic, mineral, vegetable and synthetic materials” (Smelik 2020). New materialism is described as “a specific domain within posthumanism that gives special attention to matter by avoiding binary understandings such as mind–body and human–nonhuman” (Leonard 2020). What posthumanism and the new materialism share is, therefore, their effort to overcome dualisms.

This change of perspective makes it possible to interpret the current research on fashion fabrics and materials, which has been particularly active in the last decade, as an evident encounter between technology and biology, and between humans and nature (Vanni et al. 2022). Nature is not only the object of this relationship and a

source of inspiration in materials science (Schiros et al. 2021), but it is increasingly becoming an active subject that produces ideas and constructs matter. Chiara Scarpitti explains that, “the cooperation that is spreading between the worlds of design and the natural sciences is also due to the increase in independent design practices that, on an international level, have made real a transdisciplinary dialogue that was previously only imaginary” (Scarpitti 2020: 83).

5 Nature as Fashion Material

Since the industrial revolution of the eighteenth century, the textile industry has been one of the main areas in which technology has shaped the modern world. As Smelik et al. (2016: 288) pointed out, “[h]istorically, the field of textiles and dress is closely knitted to technology”. In this regard, it is worth mentioning *Sette canne, un vestito* (*Seven Reeds, One Suit*),⁵ a 1949 short film directed by Michelangelo Antonioni made to promote the innovation of the Torviscosa’s textile industry in Friuli: in the town, founded in the 1930s on a reclaimed marshy area, there was a factory of the SNIA company for the transformation of common cane, typical of that area, into rayon. One of Italy’s most important film directors was commissioned to visually narrate the technological avant-garde of the Italian textile industry, capable of making a suit from seven reeds, as the title specifies, and leading the world into the future.

It is therefore to analyse some of the current experiments with new materials and their use in fashion design, as the process of human decentralisation in search of new “kin” (Haraway 2016) with organic and inorganic beings—plants, animals, technologies, territories—is particularly evident. The first area of investigation concerns the materials obtained from processing agri-food waste. Three selected Italian cases are discussed below.

Orange Fiber, founded in Catania in 2014, has patented a system for extracting cellulose suitable for spinning from citrus pulp, that is, from the waste from the agri-food production of juices, concentrates, perfumes, and essential oils. The yarn, classified as human-made cellulose fibre, is used to make fabrics ready for printing. The second case, Vegea, was established in Milan in 2016. They developed a process to transform wine processing waste into a leather-like material. The third case in point, Frumat, was established in Bolzano. After some unsuccessful experiments with grape and cranberry waste, they developed research on the typical fruit of that place—the apple—and succeeded in transforming it into a leather-like material called AppleSkin. To make its products, Frumat recovers around 30 tonnes of apple waste per month from local companies, which are thus relieved of disposal costs and even paid for the material. These experiments are significant for their valuing a natural product of the territory and for their reuse of the waste of one production chain, and introduction of it into another chain, giving rise to new materials for fashion. Their

⁵ <https://www.youtube.com/watch?v=vDcvrZ62IGM>.

geographical location is also interesting, since two of the three companies are located in places traditionally distant from the fashion industry (Franzo 2020).

Another research area that has been particularly active in recent years is seaweed-based fabrics and biomaterials. AlgiKnit, an American start-up founded in 2016 as part of the Biodesign Challenge of the Fashion Institute of Technology in New York is an important company working in this field. It makes durable yet biodegradable yarns from seaweed, one of the most widespread aquatic organisms. The alginate from seaweed is pulverised and turned into a water-based gel to which natural dyes are added and finally extruded into long filaments. Another patent for the transformation of seaweed into yarn belongs to the Austrian company Lenzing, whose SeaCell fibre is obtained by incorporating the dehydrated and pulverised brown seaweed *Ascophyllum nodosum*, harvested in the Icelandic fjords, into a natural cellulose fibre obtained from beech wood. Seaweed also plays a starring role in the production of technical clothing by Vollebak, which has created a compostable T-shirt. It is designed to be buried in the garden at the end of its life, where it biodegrades in 8–12 weeks depending on temperature and humidity. It is made of pulp fibres from eucalyptus and beech trees and algae grown in laboratories inside bioreactors, in line with their approach of artificialising nature. The T-shirt is printed with green ink based on spirulina algae, a natural pigment that oxidises and fades in the air, inviting one to care for it as if it were a living being. Caring is also at the heart of Biogarmentry, a non-woven fabric designed by Roya Aghighi and born from the challenge of providing survival advantage to living, photosynthetic cells of algal origin on the fabrics made of natural cellulose and protein-based fibres. These “living fabrics” are activated in the sun, transforming the surrounding carbon dioxide into oxygen, and are an invitation to take care of one’s wardrobe. Clothes, consequently, are both physically and mentally present in the consciousness of the wearer (Franzo and Moradei 2022). These cases present nature’s increasingly central role in the development of new materials for fashion (Payne et al. 2021), which become living, intelligent, “vibrant” materials (Bennett 2010).

The last two cases discussed above demonstrate an increasingly dynamic relationship between humans and non-human beings, a symbiosis between humans and nature that encourages the development of a new identity for fashion design. Lara Campos is a material driven designer, researcher and textile artist. According to her bio, “her practice blurs the boundaries between materials, technology and biology, proposing new perspectives on biocentric design. Lara believes that design can open a space for dialogue between human beings and other living beings”.⁶ She started working on *beGrounded*, a woven garment with growing sprouts, in 2019. It includes a kit with everything necessary to germinate the woven item and wear it as an idyllic representation of symbiosis with nature. The fabric and the garment become a connection between humans and nature, developing a new relationship between the body and its environment. Similarly, in the work of Suzanne Lee, who has been engaged in the *BioCouture* research project for several years, nature becomes the factory of materials for future fashion. She has created a series of jackets and shoes from

⁶ <https://lara-campos.com/aboutMe.html>.

a material that has similar properties to leather and is made using bacterial cellulose produced by bacteria in a vat of liquid. It is not only biodegradable, but also compostable. Lee's research-based fashion materials are living organisms and work in symbiosis with the human body.

The cases analysed above are representative of an approach that looks beyond the human and seeks unprecedented forms of collaboration with nature and technology. The human beings are no longer autonomous and independent moulders of matter, but allow themselves to be guided by nature. Unlike traditional materials, the living materials, in need of care and attention, completely transform the relationship of rapid and detached fruition between consumer and garment that was nurtured by fast fashion brands in recent decades.

6 Conclusions

The contribution investigated two perspectives that characterise fashion design, and the fashion materials industry in particular, in the twenty-first century: one perspective deals with positioning of humans and their needs toward the centre of interest in fashion design, in a systemic and holistic way; the other perspective investigates the awareness of the limitations of an anthropocentric vision and the need to look beyond the human in search of collaborations with the non-human world. These two trajectories are not alternatives, however, but intertwine, thus bringing an ecosystem composed of humans, plants, animals and technologies to the centre of interest of contemporary fashion design. What they have in common, however, is the need to work with new methodologies and approaches, with the aim of limiting the impacts of fashion design on the environment and people. This can be seen as a possibility in making the fashion industry an agent capable of redesigning the world and bringing social and environmental benefits (Vaccari and Vanni 2020). According to Otto von Busch (2021: 110), if we believe that design can embody values such as authenticity, honesty, or integrity, we cannot merely harbour them in commodities, and simply hope they will affect their consumer by osmosis. Through our practice, we must change focus from fashionable goods to what we can call "fashion-abilities". Once again, then, the need to reconsider the practice of fashion design as something related primarily to the meaning of the product; what we need and why would we need a new product? In the current situation of environmental and social crisis, as design researchers we need to reflect on what futures of fashion we want to support and how we can foster collaborations between people, nature and technology.

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