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New Technologies Shift in Jewelry Design:
From Traditional Optimization to Contemporary Speculation

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Structured Abstract

Purpose: The purpose of this research is to understand how the traditional values of self-adornment through jewelry interact with these new technology-driven cultures. With this research we sought to discuss how the adoption of new technologies has an impact on jewelry design, producing new technology-driven design and new jewelry habitat cultures.

Methodology: To answer this, a bibliographic review was carried out providing a theoretical foundation to address the topic. This review was based on two axes: jewelry design and new technologies for the field. First, we discuss the material and immaterial characteristics of jewelry. With this, we sought to understand how jewelry is a medium that combines meaning and material for expression and communication of individuals and social groups. Afterwards relevant new technologies for jewelry design and innovative cases of use were selected through documentary research based on the innovation of meaning (Verganti, 2016) approach. The objective of this documentary research was to understand how these designers and companies explore the expressive potential of new technologies in jewelry design.

Findings: Evidence found through such research methodologies provides valuable insight into discussions about the future of jewelry design. The cases selected reveal that it is possible to generate products with innovative meanings when displacing technologies of their traditional and expected roles.

Value: These innovative meanings may allow the discussion of societies' contemporary issues. For instance, these cases indicate how design can benefit from technology to adopt a speculative position (Dunne and Raby, 2013) and thus encourage society to discuss ideas that shape the world. A technological and humanized culture in jewelry design emerges from this. The cases selected also reveal a shift towards virtualization of the physical world. For example, the widespread use of augmented reality filters on social media indicates new values associated with self-ornamentation and a new meaning for materiality, establishing itself as a new frontier for jewelry design only allowed by the use of new digital technologies.

Keywords: jewelry design, innovation, technology, culture, product meanings, immersive technology, biotechnology.

Article Classification: General review

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Introduction

While jewelry expresses and signifies our times (Barthes, 2013), our habitat is radically changing in technological and social terms. The increased computational capacity over time has made immersive technologies closer to people's daily lives. Simultaneously, ecological problems threaten the possibilities for social interaction. New and emerging technologies such as computational design, augmented reality and biotechnology are becoming expressive means and possibilities for contemporary issues. And immersive technologies point towards a future in which the adoption of virtual products is pervasive.

The purpose of this research is to understand how the traditional values of self-adornment through jewelry interact with these new technology-driven cultures. With this research we sought to discuss how the adoption of new technologies has an impact on jewelry design, producing new technology-driven design and new jewelry habitat cultures.

To answer this, a bibliographic review was carried out providing a theoretical foundation to address the topic. This review was based on two axes: jewelry design and new technologies for the field. First, we discuss the material and immaterial characteristics of jewelry. Hereby, we sought to understand how jewelry is a medium that combines meaning and material for expression and communication of individuals and social groups. Afterwards relevant new technologies for jewelry design and innovative cases of use were selected through documentary research based on the innovation of meaning (Verganti, 2016) approach. The objective of this documentary research was to understand how these designers and companies explore the expressive potential of new technologies in jewelry design.

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These innovative meanings may allow the discussion of societies' contemporary issues. For instance, these cases indicate how design can benefit from technology to adopt a speculative position (Dunne and Raby, 2013) and thus encourage society to discuss ideas that shape the world. A technological and humanized culture in jewelry design emerges from this. The cases selected also reveal a shift towards virtualization of the physical world. For example, the widespread use of augmented reality filters on social media indicates new values associated with self-ornamentation and a new meaning for materiality, establishing itself as a new exploration space for jewelry design only allowed by the use of new digital technologies.

The jewelry on the body at a ground

The wearing of jewelry is one of the first human means of expression transcending the necessities of everyday life and has been a constant feature in mankind's existence (Eichhorn-Johannsen et al., 2015; Phillips, 2018). All over the world, jewelry has been worn for the same reasons and at the same places on the body (Unger, 2011). From primitive to sophisticated societies, the symbolic function is the essence of self-ornamentation pieces. As jewelry adds meaning to the wearer, it establishes a relation between public and private realms (Besten, 2011). Wearing jewelry, as opposed to wearing clothes, is always a choice and from this choice comes great energy (Barthes, 2013).

In the nineteenth century, with the rise of the fashion industry and women's magazines, jewelry became part of fashion (Unger, 2011). Today, that special connection remains and the boundaries between fashion and jewelry become blurred. As stated by Anne-Karlijn van Kesteren, Museum Arnhem's curator of jewelry, in an interview with Julian (2019) from Current Obsession magazine, jewelry pieces can be viewed as examples of body-related design, reiterating the place of jewelry and fashion under the same category.

The body is the preferred support for both jewelry and fashion design. As jewelry is added to the body, it becomes a sign that can be read as an expression of one's identity and social situation (Besten, 2011).

Its power lies in the expressive potential that comes from it as a result of contemporary societal questions and concerns. Thus, maker, wearer and onlooker establish a triad: jewelry is conceived and made by people, worn on the human body and the way it is worn adds a meaning that can go beyond what it was conceived for (Unger, 2011). In this triad, maker, wearer and onlooker, all contribute to the constitution of the meaning of the jewelry piece. Together, they are in an environment in which these values are projected and inferred, but the characteristics and complexities of these environments must be considered as a background in which this articulation occurs. Hence, the body and the manner it is understood in these contexts also influence the meanings of the ensemble (clothes and jewels). And it is on this body that new semantic articulations are established. The wearer represents fashion in a body. In addition to the composition on the body and the combination of various elements from what is used from head to toe, the body itself, the way it interacts with objects, moves and behaves in this environment, build sentences of the system (Barthes, 2006).

According to Evans (1989), classical jewelry's style was set by the taste of an aristocracy, and jewelry in less precious materials imitates it. Body ornamentation conveyed valuable information of hierarchy, social status and shared community values. As for today, the wearing of classical jewelry brings back these fragments of information to a new environment in which

the values of the past do not necessarily (or not always) dialogue with contemporary aspirations and desires.

For example, in Figure 1 is the portrait of Jane Seymour with her jewelry, painted between 1536 and 1537 by Holbein. By its side (Figure 2), a photograph from Bulgari's Cinemagia Collection launched in 2019. As you can see, the jewelry, clothing and even the pose of the model is similar to the painting, despite the centuries that set them apart. Nobility jewels, now considered classic jewelry, were produced to mark that individual's place in society, separating him or her from other classes. Classic jewels of contemporary production, such as the Bulgari necklace, carry the same meanings as their counterparts from other centuries and this is made clear in the manner the images are similar.

Figure 1 – Jane Seymour's portrait by Holbein painted circa 1536-37 (adapted from Lang Antiques, 2019).

Figure 2 – Dolce Vita Colors necklace released in 2019 (Bulgari, 2020).

Nevertheless, according to Unger (2011), the view that jewelry is something that separates people is the result of an approach taken by art history, which focuses only on the jewelry used by the nobility - which, in that context was precisely intended to set apart. Jewels and other forms of body adornment (as clothes), "fulfill the basic human need of ornamentation and of establishing a social position relating to others rather than setting them apart" (Unger, 2011, p. 307). As emphasized by the author, the sense of belonging is central to jewelry as jewels are signs of coherence in society, and from the moment the collective identity is established, people can communicate their personality. So, jewelry is also about bringing people together, it is about creating an intra-group identity, and not just the traditional view that it is about setting

apart and moving away. However, the constitution of identities makes differentiation possible between different groups.

Untouchable jewelry

Jewels as cultural artifacts also combine material and immaterial aspects. The former would be, primarily, characteristics such as weight, measurements and raw material, among others. The latter, the meanings they carry. In such manner, from their properties and through their uses, the materials have gained meanings regardless of the artifacts in which they are applied. According to semiotics, material and immaterial aspects are close to the articulation between signifier and signified that constitute the sign. As Barthes (2006) proposed, the signifier is a mediator, and therefore its substance is always material. It is important to point out here that the material substance does not exclude what is digital. Today we have the issue of "immaterial matter" or "untouchable material", in other words, a transduction or a translation, which in the end is the same luminous energy no longer reflected by a material, but the light emitted from the virtual adornment. The meaning, on the other hand, is a psychic representation of the thing, and its substance can be immaterial.

As mentioned by Besten (2011), without people, "jewelry only partially serves its function" (p. 11) or to other unplanned ones. That means, until then, the purpose of jewelry is fulfilled when it is worn on the physical body, in contact with and on its surface. Therefore, material and immaterial aspects are initially found in design and finally in use. The jewel detached from the body loses an essential part of its potential for expression while it acquires others. However, when “disembodied”, the jewel causes changes and changes itself. A piece of jewelry in a museum may have an educational relevance, but it is not an object made to be exposed enclosed in a glass case.

Artifacts can have universal and intrinsic meanings or personal and volatile meanings, and these meanings change according to the context in which the object is embedded (Cardoso, 1998). For example, a wedding ring has the universal meaning that the user is in a marital relationship, expressed by the choice of material and the manner it is worn on the “ring finger” in Western cultures. Heirloom jewelry, by contrast, may have as a personal and affective meaning the memory of the relative to whom it belonged in the past.

There is a relationship of interdependence between material and immaterial aspects in the design of these objects. At the same time that the material characteristics are important parameters in the development and production of personal adornments, these characteristics are related to the meanings given to these artifacts. For example, in the case of classic jewelry, the value of a piece lies both in the price of the raw materials (precious metals and gemstones),

as well as in the meanings this sort of body ornament has for the wearer and the social group in which he or she belongs to.

Without the preciousness of the materials, classic jewelry fails to fulfill its social function, which is to unite that group of wearers while distinguishing them from others by demonstrating economic power. As Barthes (2013) mentions, the combination of gold and precious stones becomes the very concept of price and being seen is enough to demonstrate its power.

Due to this, the technologies and manufacturing processes operate on the material aspects of classical jewelry to make it viable, contributing to the attribution of meanings. In this universe, technique, skill and precious materials are intrinsic to the very concept of classical jewelry.

Contemporary body ornamentation, on the contrary, frees itself from the values associated with precious materials, techniques and skills of classical jewelry, as well as from their respective expressive limits.

Jewelry at an untouchable social-digital habitat: from metalwork to biodesign

Reflecting society's contemporary questions, issues and concerns, designers and artists use jewelry as means of expression for them, allowing for an interdisciplinary approach that does not restrict jewelry to something apart from art, design and fashion.

As elaborated by Unger (2011, p. 315), "jewelry is closely related to the way people dress and behave, and to the social, cultural, economic and political framework in which they live." Adopting a speculative and/or innovative approach, new narratives in jewelry design bring to light issues and problems pertinent to societies today. By doing so, jewelry makers are trying to have an influence on the world we live in, and also trying to imagine what issues will be relevant in the next years, in order to contribute to a preferable future before social changes occur.

For Unger (2011), the maker, the wearer and the way jewelry is worn can be just as relevant. For the generation of these innovative and/or speculative projects, the maker can employ the most varied technologies to make his or her idea viable, diverging from the optimization-oriented application or the innovation of already existing manufacturing processes. Today, as Kesteren acknowledges in Current Obsession's interview by Julian (2019), the influence of the digital sphere extends to our human condition, from social media to face recognition software. Simultaneously, biotechnology is coming forth as an emerging technology, which is why it is still in the maturation period. However, the use of these technologies alone does not guarantee that the resulting artifacts will have relevant values and meanings for our time.

According to Phillips (2018), technical developments have been implemented in the production of self-adornment as new techniques were discovered. The first known adornments included teeth and bone pendants. With the learning of drilling and carving, variety in jewelry increased. However, a breakthrough came with the development of metalworking techniques. A wide variety of body ornaments were enabled. Some of these techniques persist even today with only small enhancements due to the development of skills and production processes. Thereby, classical jewelry has changed slightly since the Renaissance.

This does not mean that classic jewelry has stopped in time or lost value. Classical jewelry upholds and crystallizes itself based on the materials, technologies employed and the use of reproduced "models" and its “types” or “variants” (Argan, 1993) that arise, in turn, as a result of these choices of materials and techniques. What happens then is that, as jewelry starts to represent this expression created by itself, it becomes a symbol of this very model. To the extent that this expression does not meet societies' new needs and, therefore, new solutions arise from "contemporary jewelry". And once again, the very expression of classical jewelry is transformed or pushed to another place by the contrast with these new expressions of contemporary jewelry. And then, each in their own way, they become part of the same system: jewelry, or more broadly, fashion.

New technologies are commonly employed to produce more precisely and efficiently what was previously handcrafted. At this point, the use of these technologies is primarily aimed at solving issues related to the material characteristics of the adornment piece. For example, computer-aided design (CAD) software is largely applied to jewelry’s design processes to communicate ideas more easily and quickly, to explore the variety of possibilities, and to deliver precise results in production. When innovation occurs incrementally in manufacturing processes, the general concept of the object is preserved over time (Pugh, 1991). Therefore, the meanings associated with classical jewelry remain almost unchanged. Although classical jewelry still has a place in contemporary society, the technology applied to it ends up being aimed only at optimization.

With what has been exposed, it is clear that innovation is not just about proposing new styles or new formal solutions for adornment. As Verganti (2016) suggests, in a world awash with ideas, innovation can come from developing meaningful products. The author proposes that there are 2 types of innovation: of solutions and of meanings. The former is about proposing new ideas to solve established problems (make something better), being a linear strategy. The innovation of meanings, contrarily, brings a new “why”, a new reason why people utilize a product.

The innovation of meanings does not start from observing the needs of users, but from understanding the context (habitat) in which they are inserted. And today, the digital environment is the new context for the utilization of personal adornments, making it possible to assign new meanings to it.

If incremental enhancements are a result of seeking optimization in the design process, in contrast, radically changing the emotional and symbolic content of products only comes from a deep understanding of society changes (Verganti, 2008). As radical innovations are driven by technology changes (Norman and Verganti, 2014), the addition of these new technologies gradually causes a profound change in the meanings associated with jewelry. Thus the adoption of new technologies has the potential to represent a radical change in self-ornamentation, opening a new exploration field for designers. As Picon (2013) acknowledges, the present is a result of a complex reinterpretation of elements from the past.

Therefore, it is possible to employ technology as a form of expression, adding meaning to the jewel. As new technologies are adopted at first as tools, gradually its use allows for new social interactions and forms of expression, becoming an integrated art form. A novel technological culture is formed around this use while it shifts the traditional meanings of jewelry.

From tool user to digital toolmaker

CAD/CAM is widely applied in jewelry design's production, from industrial manufacturing scale to one-of-a-kind pieces. Within CAD, 3D modelling stands out, which in this scope is used with two intentions: reproduction and representation.

These software programs are applied to represent virtually the final product, thus facilitating the understanding of the project and supporting decision making among the stakeholders involved in the production. Technical solutions that impact the entire production chain are taken in the 3D modelling phase.

In a traditional approach, virtual modelling comes as a transposition of manual drawing into a virtual environment, using the tools available in the software program for the construction of the model. Combined with 3D printing, manual processes such as lost wax casting and traditional bench techniques are replaced. In other words, these two technologies are applied in a combined manner to deliver the final physical product.

However, as Peters (2013) emphasizes, in the same manner that manual drawing can be used to detail and conceptualize ideas, computational tools can be employed not only for conceptual sketching but also to increase efficiency and communicate ideas. CAD/CAM technologies also allowed the creation of parts that were previously impossible or almost

impossible to produce manually. For this reason, they became useful technologies for jewelry manufacturing processes, which, in turn, benefit from these digital tools for solving technical scope problems. Therefore, when reproducing immutable styles of personal adornments for centuries, the meanings associated with them remain similar, and the expressive potential of digital technologies comes to be the same as that of traditional manual techniques.

In jewelry, parametric design has been one of the main developments in virtual modelling. With parametric diagrams and scripting, it allows the generation of dynamic models with interrelated parameters. For the industry, this means flexibility and accuracy in the design and manufacture process, since it can be applied in a large variety of practices, and also means the offering of a risk-free environment for experimentation (Poole and Schvartzberg, 2015).

Computational design tools yield more than the generation of a 3D model of the product. As Picon (2013) indicates, computational software allows managing complex patterns and textures through deformation, tiling and tessellation, adding new possibilities to explore the surface of objects and buildings. Through the interaction between designer, design environment and process, computation has the possibility to redefine how jewelry design is done. The contribution goes beyond the optimization of the creation and production practices. A new exploration space is opened, allowing the generation of innovative products.

This new environment (or habitat) also brings new requirements for the jewelry designer, such as knowledge of scripting and mathematical thinking. With this, the designer moves from tool user to toolmaker in this new digital habitat.

However, as Peters (2013) points out, scripting degenerates if considered only as a skill separated from the design, becoming an isolated craft rather than an integrated art form. Therefore, computational design seems to promote a homogeneous new digital aesthetic due to the extensive usage of parametric and algorithmic modelling software programs. An example of this is what happens with the excessive use of the pattern resulting from the Voronoi Diagram, allowed thanks to computational advances, and applied to any object indiscriminately, be it jewels or anything else (Figure 3).

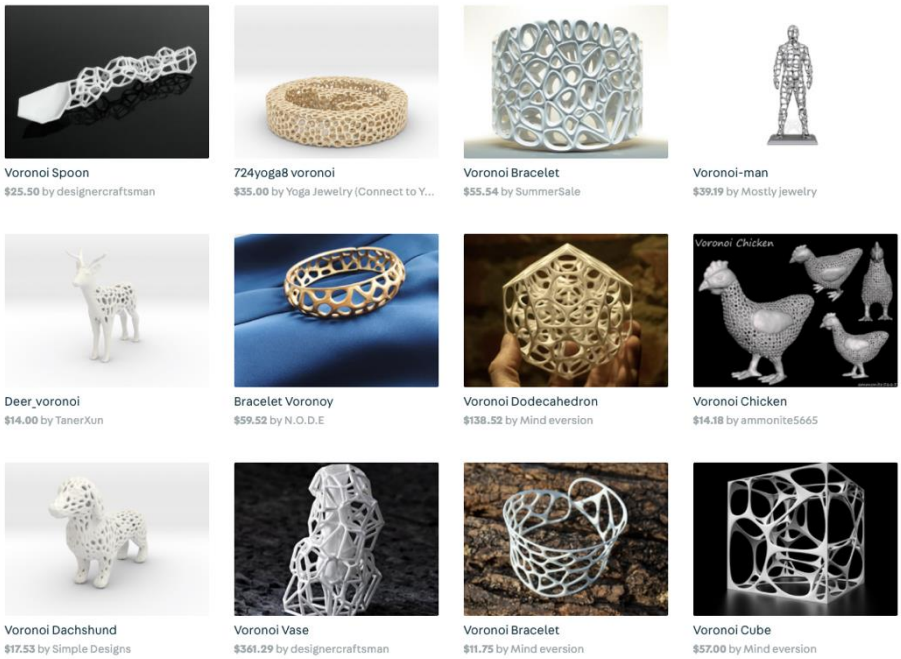


Figure 3 – Screenshot of Voronoi Diagram applied to jewelry and other objects (Shapeways, 2020).

Thus, it is clear that the advancements in computational design technologies do not guarantee the creation of products with innovative meanings. These technologies exist in a specific habitat and are conditioned to the will of the user. Disconnected from the present issues, they become isolated crafts.

The environment of use for jewelry design is also changed through the redefinition of making and the exploration possibilities. These transformations, together with the new social ecosystem, allow changes in the very sense of the jewel.

Playing with tools and digital environments

Digital technologies can be used independently or integrated with other technologies. If the ultimate goal is to produce physical ornaments, computational design can lead to computationally driven manufacturing. The expected result is what defines the combination of technologies to achieve it, as can be seen in the following examples.

Nervous System is a studio that works with computational simulation and digital fabrication to generate and fabricate products. Founded by Jessica Rosenkrantz and Jesse Louis-Rosenberg, their goal is to create unique and affordable artifacts, including jewelry, inspired by natural phenomena.

In a traditional approach of digital design technologies, the customer chooses the shape/type he or she wants his or her jewel to be - even if it is chosen within the supplied

catalogue -, while the maker builds the piece. From that, Nervous System studio developed a script for its website in which the customer can customize the adornment alone through the application (Figure 4), becoming a co-author of an exclusive jewel by the brand. The script is able to place all the hinged panels on the piece, so the generated necklace is produced by 3D printing without the need of mounting the fittings. Although the customization possibilities are limited to the script generation rules, approaching customization in such manner shifts the roles of maker and wearer from their expected places.

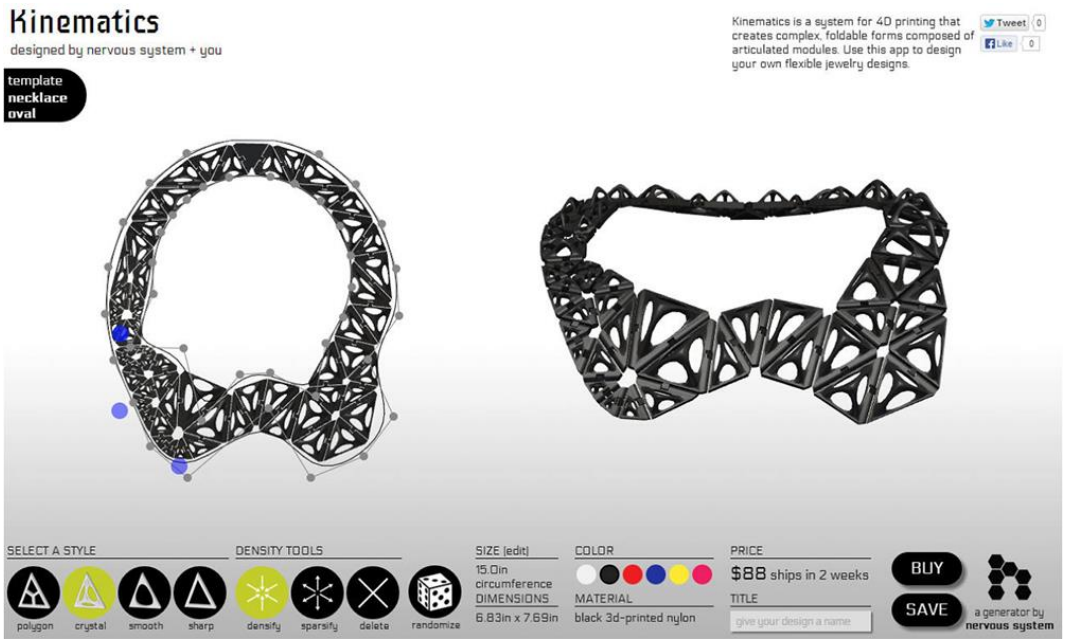


Figure 4 – Kinematics app for designing custom necklaces (Nervous System, 2014).

Also in the scope of computational design, there are the works of MHOX and Mediated Matter that explore this technology in an integrated way with biotechnological speculation and post-naturalism.

MHOX is an independent design research group founded by Filippo Nassetti and Alessandro Zomparelli focused on both speculative and commercial projects. With generative design and 3D printing, they seek the innovation of wearable products. The group believes that technological evolution discloses spaces for new experiences. In Superabundance Mask (Figures 5 and 6), the human body is viewed as a territory for the formation of a fibrous bio-digital entity. The fibrous tissue covers the entire face, making it featureless. The boundaries among human, object and environment are undefined. With this, the project aims at discussing the connection and conflicts between nature and technology through the human body and a synthetic formation.

The final result was achieved by integrating digital simulation of natural systems and body mapping, and was produced through additive manufacturing. The aggregate properties of the tissue can be controlled, such as density and orientation, but not the shape of its elements.


Figures 5 and 6 – Superabundance mask (MHOX, 2020).

The Mediated Matter is a design and research group who focuses on “Nature-Inspired Design and Design-inspired Nature” (Mediated Matter, 2020). Their approach combines design with science and technological innovation. Their projects are made integrating computational form-finding with biologically inspired fabrication. With this, they aim to enhance the relationship among humans, objects and the environment.

Vespers is a collection of masks developed by Mediated Matter that pairs cutting-edge computational and fabrication technologies with speculative design. Divided into three series (Vespers I, Vespers II and Vespers III), the collection explores “what it means to design (with) life” (Mediated Matter, 2020). Inspired by death masks, it explores the progression of the masks from a symbolic cultural relic (Vespers I), to a transition object between life and death (Vespers II), and finally to a functional biological interface (Vespers III).

According to the group, in this collection, they imagine an imminent future in which the wearable interfaces and building skins can be customized to the body and environment of the wearer. This includes custom-made materials, shapes, chemicals and even genetic manipulation. Helping to treat diseases or even detecting contamination in the environment are a few of the examples that may emerge from their research.

In Vespers III (Figure 7, 8, 9 and 10), the question revolves around death and rebirth through the circle of life. Once the wearer is dead, the mask “re-engineer” life by guiding living microorganisms through the artifact and becomes a biological urn.

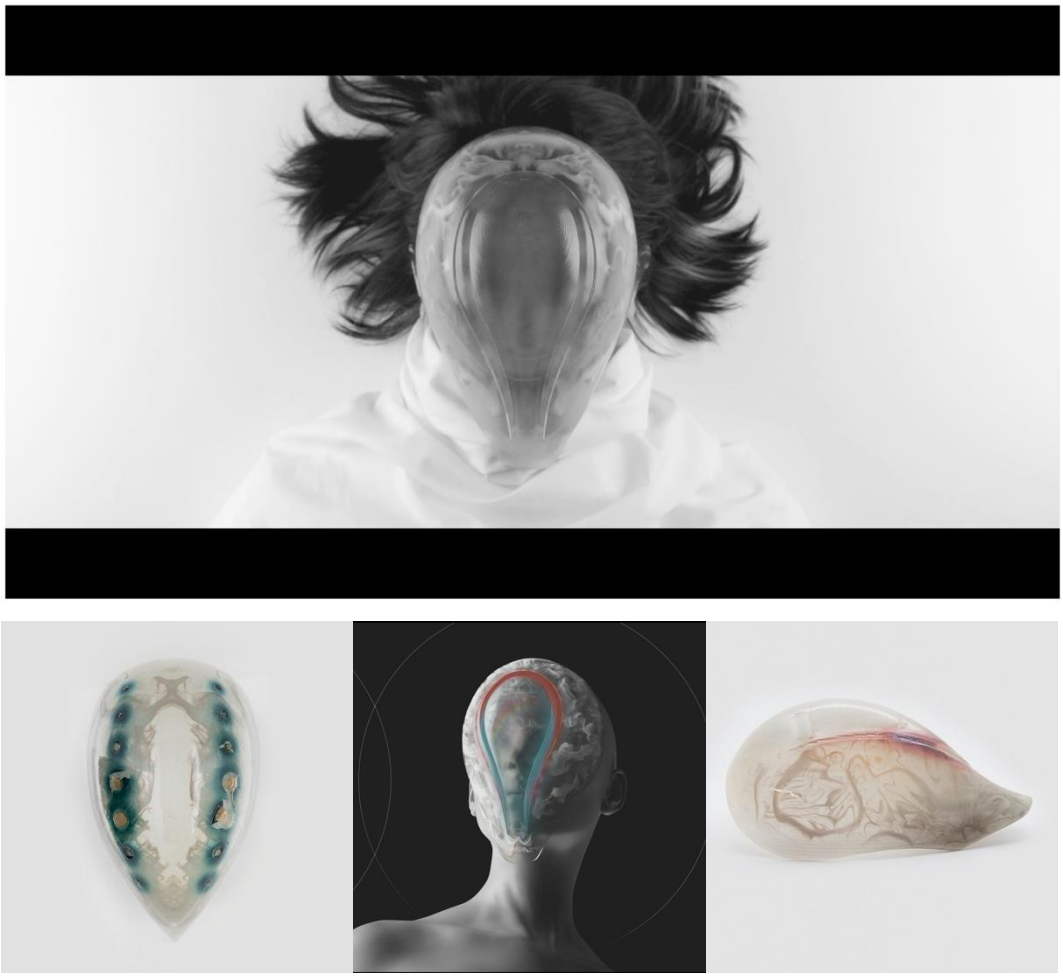


Figure 7, 8, 9 and 10 – Vespers III masks (Mediated Matter, 2020).

With the Vespers collection, the Mediated Matter group rethinks and resignifies how we deal with death. Thus, creating a new design space for biotechnology and hybrid living materials research and what impacts it could bring to future societies.

As seen in the cases above, the concern with sustainability and new ways of relating to nature is translated through the body ornamentation pieces presented. Therefore, contemporary purposes and issues call for new means of expression, which go beyond what traditional jewelry technologies can offer.

However, with the current mediation of social relationships by virtual environments, digital manufacturing is no longer one of the expected results of using digital design technologies and becomes an option, as will be seen next.

Digital socialization *filters* design

The increased computational capacity has made immersive technologies closer to people's daily lives. These technologies point towards a future in which the adoption of virtual products is increasing.

Changes occur when technology and an opportune environment converge. As Adner & Kapoor (2016) mention, understanding the ecosystem that supports them is as important as the utilization of new technologies. The COVID-19 pandemic forced a hasty transposition to the virtual environment of the relationships that used to happen in a physical environment. This digital social habitat is the new habitat for wearing body ornaments. If relationships are now mediated by the digital, different forms of self-expression will also adopt this medium. As pointed out by Marina Elenskaya (2019) in contemporary jewelry's magazine Current Obsession, “the ways we present and modify our digital proxies are as much part of our self-expression as the ways we adorn our physical bodies.” Considering this, the digital identity is part of how we present ourselves to the world now.

The virtual jewelry can be inserted through the manipulation of photographs or videos with the aid of specific software, as seen in Figure 11. This type of use of digital adornments requires post-production, demanding specialized knowledge from the maker, such as the mastery of digital tools and/or appropriate equipment.

Figure 11 – Digital hair accessories (Nguyen, 2019).

However, with the widespread adoption of smartphones and new facial recognition algorithms, there was a boom of augmented reality (AR) filters on social media. Among the

possibilities brought, some filters simply replicate the application of makeup, while others add personal adornments or even completely distort the features of the face.

Ines Alpha is a digital artist and often considered one of the pioneers in the adoption of augmented reality as a form of body ornamentation. Her work gained proportions and today she works in partnership with several brands (Figure 12), such as Nike, and media outlets, such as Allure magazine (Figure 13). As she points in an interview for Current Obsession (Elenskaya, 2019), with the possibilities brought by the augmented reality filters of Snapchat and Instagram apps, her creations could impact a greater number of people.

Ines Alpha seeks in her work to make reality more fantastic, and for that, she uses AR to develop "3D makeup" that explores beauty through technology. The artist believes that, in the future, augmented reality lenses will be common and this form of ornamentation through filters will be ubiquitous.

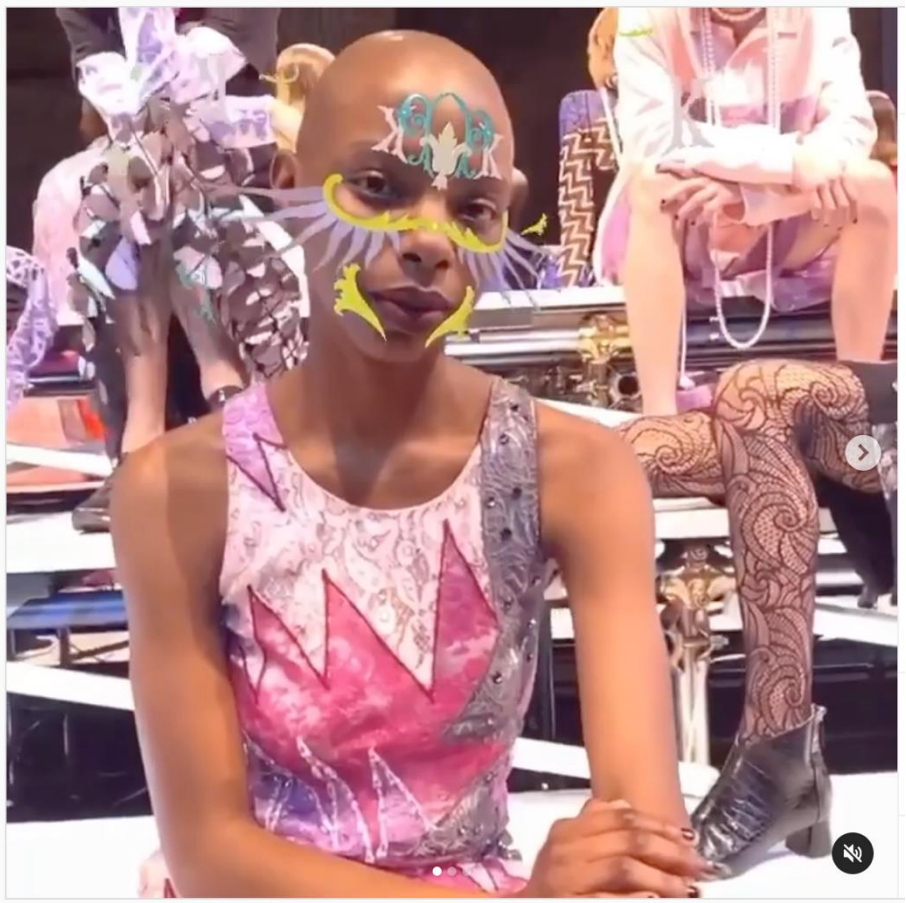


Figure 12 – Filter for Koché and Emilio Pucci collaboration (Ines Alpha, 2020).

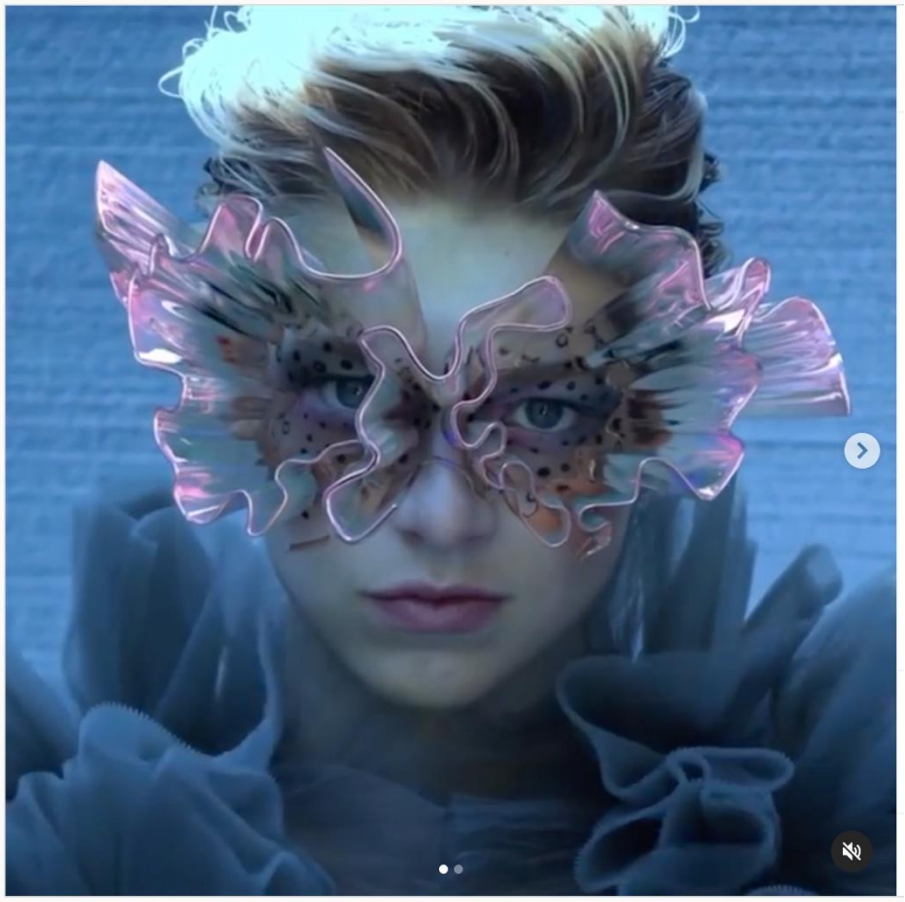


Figure 13 – Ines Alpha's digital filter for Allure Magazine (@ines.alpha, 2020).

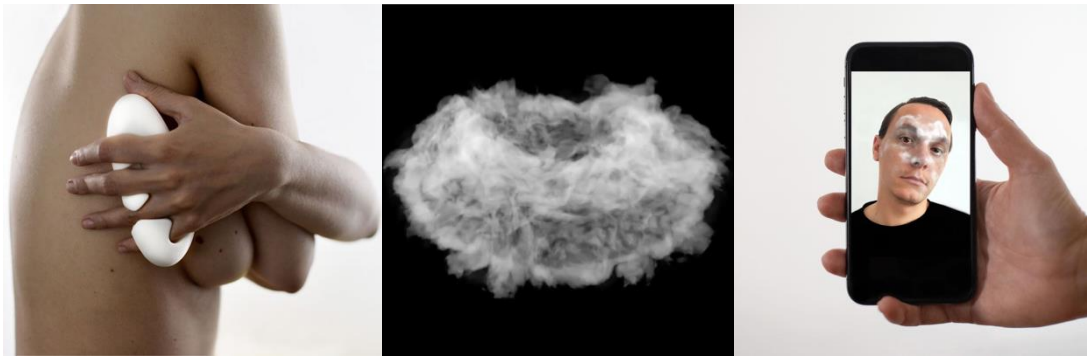
The mix of virtual body ornaments with digital pictures or trough filters contributes to creating today's visual culture in social media. This culture is strongly marked by "do it yourself", with the production of virtual adornments occurring in a decentralized manner, both by major brands and by artists, designers and amateurs.

The social media networks themselves have facilitated the configuration of online communities in which knowledge is distributed in a rhizomatic manner. With tutorials on the internet, it became easier for those interested in learning how to make their own digital ornaments and distribute them. For example, Facebook Inc. made the free Spark AR software available for creating augmented reality filters, which can be uploaded to Instagram.

Virtual products are not new. In gamer culture, buying and selling virtual items within games is common practice. Besides, products like Spotify and Netflix are entirely virtual and have a reach that surpasses niche markets. However, it is possible to combine virtual and physical products in hybrid forms of body ornamentation.

Smaranda Voican presented a mixed-reality collection of jewelry as a graduation project for the University of Arts London (Central Saint Martins) in 2020. Aide-memoire (Figures 14, 15 and 16) takes a speculative approach to discuss and raise awareness of the climate crisis and the

implications of design in this context. The collection consists of augmented reality filters and 3D printed biodegradable pieces (referred to as ephemeral jewelry). The aim was to develop a waste-free production method for the collection. As stated by the author, “while constantly living in our digital bubble we remain oblivious to the transformation of our environment” (Voican, 2020).



Figures 14, 15 and 16 – Aide-memoire: mixed-reality approach of jewelry (Voican, 2020).

Voican's work overcomes the barriers between physical and virtual by presenting a mixed-reality collection under the same concept, in which the interaction between the different forms in which the ornament is presented is an essential element. This approach accurately reflects the habitat in which personal adornments are located in contemporary times. We live in the physical world, but mediated by digital technologies and consuming both physical and virtual products. In this environment, the classic styles of body ornamentation are being modified and adopted in conjunction with new social demands and technologies, and thus generating new meanings.

The digital technologies for representation and simulation, as shown above, are also transformed into "manufacturing" or materialization technologies for use in the digital world, indicating that they are no longer tools employed only as a medium to visualize and design what is physical, but became tools to make the existence of the virtual object viable.

Biological futures in jewelry design

Design can help explore perceptions of biofutures before they happen through tangible examples that are open to discussion and debate, contributing with the regulations that ensure the most humane, ethical and desirable futures will become reality (Dunne and Raby, 2013). If bio-jewels are not yet fully available on the market, design can help to imagine these subsequent scenarios through the development of speculative products, such as Amy Congdon's Biological Atelier series. As Dunne and Raby (2013) enunciate, thinking about the future in the context of

speculative design is to open spaces for discussion and debate, thus better understanding the present. As they state, “design speculations can act as a catalyst for collectively redefining our relationship to reality” (p.2).

Congdon believes biotechnology is going to give completely new materials and tools to be explored by designers in the future. Instead of being made, as we do today, these materials and tools will be grown, blurring the role of the designer, the craftsman and the scientist (Congdon, 2016).

In the speculative project Biological Atelier (Figure 17 and Figure *18*), textile design and its skills are combined with bioengineering. Luxury materials could be fashioned from cells, not fabrics. With this, Congdon raises questions about how these new possibilities will affect the design and what new material hybrids we could expect from this. For example, Congdon (2016) states that ivory could be ethically grown. In this scenario, our bodies and those of other species could be manipulated to solve the complex problems that we face today.

Figure 17 – Biological Atelier: SS 2082 ‘Extinct’ Collection necklace (Congdon, 2016).
Figure 18 – Biological Atelier: SS 2082 ‘Extinct’ Collection bracelet (Congdon, 2016).

Figure 19 – Biological Atelier: AW 2082 ‘Bio Nouveau’ Collection accessory (Congdon, 2016).

Figure 20 – Biological Atelier: AW 2082 ‘Bio Nouveau’ Collection ear cuff (Congdon, 2016).

However, going back to the example of ivory, Zhou (2014) states that although synthetic ivory can be crafted cheaper and to the same standards as genuine ivory today, this has not solved the problems that this material involves and has not diminished the illegal ivory trade. This shows how the projected situations do not always unfold, as different and unexpected directions can be taken with the influence of the environment and people.

Biotechnologies are emerging technologies, and there is still a need for maturation until they are readily available, so the development of speculative projects is necessary to explore possibilities that ethically guide their development. If the prospect of growing highly specific materials and tools is encouraging, the possibilities of biotechnology also light up a warning signal. The manipulation of genetically modified living organisms and hybrids can be used unscrupulously if not regulated, offering risks to people and the environment. Through design, it is possible to imagine these scenarios that have not yet happened and thus discuss what the ethical limits of biomanipulation would be. Although the future is unpredictable, the discussion of speculative scenarios provides the basis for action.

Conclusion

The meanings added by body ornamentation emphasizes the body’s expression. The work of the professionals presented pushes the limits of jewelry design through digital and biotechnologies. They enter the field of innovation of meanings and speculation as they displace technology, at the same time reformulating the meanings of body ornamentation and proposing new preferable future scenarios. In their approach, they use the technologies available as tools to understand and redesign the present, contributing to the new meanings body ornamentation conveys in contemporary societies.

New technologies appear for jewelry design, but in their peculiar fullness they merge with each other, and the former surpasses the latter, blurring the boundaries between them. What remains in this new environment is the immaterial legacy of classical jewelry and the very concept that adornment brings together and sets apart at the same time, even in the social-digital habitat.

References

Adner, R. and Kapoor, R. (2016), “Right Tech, Wrong Time”, Harvard Business Review, nov., pp. 60-67.

Argan, G. (1993), “A História na Metodologia do Projeto”, Revista Caramelo, n. 6, São Paulo, pp. 156-170.

Barthes, R. (2013), The Language of Fashion, Bloomsbury, London.

Barthes, R. (2006), Elementos de Semiologia, Editora Cultrix, São Paulo.

Besten, L. (2011), On Jewellery: A Compendium of International Contemporary Art Jewellery, Arnoldsche Art Publishers, Stuttgart.

BULGARI. (2020), “Cinemagia High Jewelry Collection”, available at: https://www.bulgari.com/en-us/high-jewelry/cinemagia/ (Accessed: 03 October 2020).

Cardoso, R. (1998), “Design, cultura material e o fetichismo dos objetos”, Revista Arcos, v. 1, n. 1, Rio de Janeiro, pp. 14-39.

Congdon, A. (2016), “Biological Atelier: SS 2082 ‘Extinct’ Collection”, available at: http://www.amycongdon.com/biological-atelier-ss-2082-extinct (Acessed: 16 September 2020).

Congdon, A. (2016), “Biological Atelier: AW 2082 ‘Bio Nouveau’ Collection”, available at: http://www.amycongdon.com/biological-atelier-aw-2082 (Acessed: 16 September 2020).

Dunne, A. and Raby, F. (2013), Speculative Everything: Design, Fiction, and Social Dreaming, The MIT Press, Cambridge.

Eichhorn-Johannsen, M., Rasche, A., Bähr, A. and Schneider, S. (2015), 25,000 Years of Jewelry, Prestel, Munich.

Elenskaya, M. (2019), “About Face: Interview with James T. Merry and Inès Alpha”, available at: https://www.current-obsession.com/about-face/ (Accessed: 18 August 2020).

Evans, J. (1989), A History of Jewellery: 1100-1870, Dover Publications, New York.

Fashion Crossover (2020), “Smaranda Voican | Central Saint Martin”, available at: https://www.fashioncrossover-london.com/smaranda-voican-central-saint-martins-2020-i3446 (Acessed: 01 October 2020).

Ines Alpha (2020), “I collaborated with @allure magazine for their last 'The Future of Beauty' issue”, 15 August [Instagram], available at: https://www.instagram.com/p/CD6pYWuqTzG/ (Accessed: 18 August 2020).

Ines Alpha (2020), “I like to think of digital/AR makeup as an accessory that can complement a fashion look”, 08 March [Instagram], available at: https://www.instagram.com/p/B9Z0ON2oolD/ (Accessed: 20 March 2020).

Julian, H. (2019), “Body Control: Interview with Anne-Karlijn van Kesteren”, Current Obsession, available at: https://www.current-obsession.com/body-control/ (Accessed: 20 August 2020)

Lang Antiques (2019), “Renaissance Jewelry”, available at:

https://www.langantiques.com/university/renaissance-jewelry/ (Accessed: 04 September 2020).

Mediated Matter (2020), “Vespers III”, available at: https://mediatedmattergroup.com/vespers-iii (Accessed: 05 September 2020).

MHOX (2020), “Superabundance”, available at: http://mhoxdesign.com/superabundance-en.html (Acessed: 19 September 2020).

Nervous System (2014), “Kinematics apps”, available at: https://n-e-r-v-o-u-s.com/projects/albums/kinematics-apps/ (Accessed: 18 August 2020).

Nguyen, N. (2019), “idk who needs to hear this but it's best to move on”, 21 February [Instagram], available at: https://www.instagram.com/p/BuJ53N3Hw2V/ (Accessed: 18 August 2020).

Norman, D. and Verganti, R. (2014), “Incremental and Radical Innovation: Design Research vs. Technology and Meaning Change”, Design Issues, Vol. 30, No. 1, pp. 78-96.

Peters, B. (2013), “Computation Works: the building of algorithmic thought”, Architectural Design, Vol. 83, No. 2, pp. 8-15.

Phillips, C. (2018), Jewelry: From Antiquity to the Present, Thames & Hudson, London.

Picon, A. (2013), Ornament: The Politics of Architecture and Subjectivity, John Wiley & Sons Ltd, Chichester.

Poole, M. and Schvartzberg, M. (2015), The Politics of Parametricism: Digital Technologies in Architecture, Bloomsbury, London.

Pugh, S. (1991), Total Design: Integrated Methods for Successful Product Engineering, Addison Wesley, Wokingham.

SHAPEWAYS (2020), “Shapeways 3D Printing Marketplace”, available at: https://www.shapeways.com/marketplace?type=product&q=voronoi (Accessed: 01 October 2020).

Unger, M., (2011), “Temptation”, Lindemann, W., Thinking Jewellery, Arnoldsche Verlagsanstalt, Stuttgart, pp. 303-319.

Verganti, R. (2008), “Design, Meanings and Radical Innovation: A metamodel and a Research Agenda”, The Journal of Product Innovation Management, Vol. 25, No. 1, pp. 436-456.

Verganti, R. (2016), Overcrowded: Designing Meaningful Products in a World Awash with Ideas, The MIT Press, Cambridge.

Voican, S. (2020). “Here’s a glimpse of my mixed-reality collection, Aide-memoire”, 14 September [Instagram], available at: https://www.instagram.com/p/CFHaKDJhavU/ (Accessed: 20 September 2020).

Voican, S. (2020). “While constantly living in our digital bubble we remain oblivious to the transformation of our environment”, 29 July [Instagram], available at: https://www.instagram.com/p/CDN6pADJp5R/ (Accessed: 05 September 2020).

Zhou, Z. (2014), “Synthetic ivory fails to stop illegal trade”, Nature, v. 507, n. 40.