

## **A virtual Ainu fish skin workshop during Covid-19 times**

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### **Abstract**

From April to June 2020, during the Covid-19 isolation, Ran Graber, a third-year student of Shenkar University, Tel Aviv, elected to study and remake a 19th century fish skin attush (Ainu robe), under the guidance of Elisa Palomino, Orit Freilich, Ran Kassas and Debbie Elhayeni, as part of the F4\*3D course. This small project of individuals – one student, one course, one study, one sample – nevertheless brought together workwear and artwear, utilitarianism and spirituality, ancient tradition/history, contemporary society, and future thinking. It brought together Tel Aviv, London, and Hokkaido – as well as all of you here now, from across the globe.

By disseminating the ancient Indigenous Ainu fish skin craft – as exemplified in this robe – to a non-Indigenous student, we were able not only to provide an example of an environmentally sustainable alternative material for fashion, but also, in so doing, to suggest a way of preventing marine pollution by exploiting skins discarded by the food industry that would otherwise be thrown in the sea. We were able to sustain an endangered historic tradition, to bring it to a new arena, and to plant the seeds of its further dissemination as the fashion students graduate and become industry professionals across the world.

The paper is centred on the research questions:

‘How can we assist fashion students in developing sustainable materials by sharing traditional fish skin craft from Ainu Indigenous Peoples?’

‘How can a faculty provide creative new ways of teaching that benefit both staff and students during difficult times?’

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Fig. 1 Ran Graber's sketchbook

### ***Fish Leather as an alternative material for fashion***

Fashion is a global industry. The problems of the world are the problems of fashion, in cause and effect. These environmental, social, and economic challenges, very real to the fashion world, are only microcosms of their global equivalents. The growing environmental crisis calls urgently for action. The Covid-19 pandemic presented an immediate crisis, necessitating rapid and radical change. While bringing new problems in its wake, it demonstrated our ability to adapt, at speed. Now we need to match this reactivity to the global environmental crisis. Because the issues and implications are literally global, there is no single solution - rather a series of endeavours contributing to overall amelioration. We hope that this workshop may be one such endeavour.

The fashion industry creates massive, acknowledged pollution. The leather industry contributes to greenhouse gases through deforestation for grazing cattle and the methane they release. Bovine leather is slow and expensive to grow (even without ensuring good quality of life before slaughter). Vegan leather alternatives are bonded with up to 40% of fossil fuel-based polymers that will never biodegrade. Fish leather provides an alternative with positive environmental, social, and economic implications that are practical, practiced, and practicable.

Fish - for food - is an established, flourishing sector. Fish has significant nutritional benefits over meat, is more rapidly harvestable and does not add to carbon emissions. Fish leather, a by-product from fileting, would otherwise be thrown back into the ocean, creating 20 million tons of discards yearly, worldwide. This

is not just a double good preventing pollution and creating a product from a free source, it is multiply positive - lessening the need for environmentally damaging leather, while creating a circular economy; providing local employment; increasing a sense of community; keeping alive an endangered ancient craft; and, finally, providing the demanding fashion industry with novelty and beauty.

This case study creates a concatenation of players and of impact - the coat, the course, the teachers, the Ainu, the world. The coat is studied as part of the course, supervised by the teachers, drawing on Ainu subsistence resourcefulness in the face of adversity – which outlook speaks to a world shaken now by the adversities of Covid, and in the immediate future by those of the climate crisis. This is how the elements link: for clarity, we will discuss them one by one.

### ***Ainu Indigenous Peoples and fish skin***

The use of fish skin to create articles of clothing is an ancient tradition shared by Arctic and Sub Arctic societies along rivers and coasts. This grouping encompasses Iceland to the Sami region in Scandinavia – Sweden, Norway, and Finland – through the Russian Far East, Northeast China, the traditional Ainu islands of Hokkaido in Japan and Sakhalin in Russia, to the North American Arctic in the east (Palomino, 2021). Before synthetic fibres were invented, people clothed themselves with whatever they could – namely the natural materials available in their surroundings - like fish skin (Palomino, 2020). Subsistence living in a harsh climate requires frugality, intelligence, and resourcefulness. Nothing is wasted – because waste could be a matter of life and death. We must learn from this now, and change, lest our profligacy be the death of us.

The Ainu are an Indigenous Peoples of Japan (Hokkaidō and formerly North-Eastern Honshū) and Russia (Sakhalin, the Kuril Islands, Khabarovsk Krai, and the Kamchatka Peninsula). The Ainu economy was based on hunting, fishing (figure 3), and gathering. Ainu people made clothes by sewing together fish skins such as those of salmon and trout. For Ainu Indigenous Peoples (figure 2), their relationship with fish plays an important role in maintaining their identities, creating important ties with the environment. The Ainu indigenous people drew a sense of their identity in relation to fish; for them, fish, man, and the environment were all one, all equal.



Fig 2. AINU man. Hata, Awagimaru. Ezotō Kikan. Japan 1799. Library of Congress. Washington DC



Fig 3. AINU men fishing. Hata, Awagimaru. Ezotō Kikan. Japan 1799. Library of Congress. Washington DC.

Throughout the centuries, fish were the main bounty of the AINU land. The perennial river and lake fish were joined each year by spawning transient newcomers: humpback salmon, chum, taimen and hucho. Natural resources (primarily fish) determined the lifestyle and economic activity of the AINU. Even the pattern of settlement was determined by their fishing habits - mainly in areas of abundant fish stock - on the seashore, in gulfs and at the mouths of rivers, in lagoons or in the centre of islands close to spawning rivers (Takasami, 1998). The AINU placed primary importance on fish as a food resource, fresh in summer and spring, and preserved for later use in winter - when they subsisted on it.

Fish are deeply related to the AINU religion. Fish not only nurtured the body but also the soul. The AINU revere multiform spiritual entities - kamui - God-spirits, who will visit the earth assuming the forms of flora, fauna, and forces of nature. The communication between the AINU and these multiform entities is expressed through a sensitive approach to working with natural materials, and the creation of objects and clothing under an aesthetic imbued with spirituality. Traditionally, the AINU made their clothes with the materials resulting from their "exchanges" with various animal and plant species. As with all the fishing populations of the Amur River basin and the shores of the Sea of Okhotsk, fish skin was their preferred traditional material, which they worked with care and reverence (Cevoli, 2015).

Despite the importance of salmon to the Ainu, the Japanese government banned their salmon fishing in the 1870s, as Part of the Meiji regime’s enforced assimilation policies, during their colonization of Hokkaido. Consequently, Ainu people who relied on salmon to support their families were prohibited from fishing it. This had a negative impact on the Indigenous population. Today, the Ainu people are engaged in a movement attempting to reassert their rights as Indigenous Peoples and to restore important elements of their traditional culture like their fishing rights (Ichikawa, 2003).

### ***Historical fish skin artefacts in international museums***

During the workshop Elisa shared with Ran a series of Ainu fish skin artefacts from archives and museum collections that she had visited during her previous fieldwork around the Hokkaido Island of Japan. The 19th and early 20th century objects shared with Ran are everyday items of clothing (Figure 4), bags, boots, and mittens. Today, these artefacts are sought after for their artistic value, craft, and representation of cultural development, and of humanity adapting to a wide range of environmental conditions (Fitzhugh, 2007). The museums' fish skin artefacts provided the student with an overall idea of the original culture of the Sakhalin and Hokkaido Ainu: their main economic activities (fishing, hunting, gathering and agriculture); domestic activities and handcrafts (wood processing, weaving, fur, and fish skin processing); their everyday items, spiritual culture, and traditional religious beliefs, which we shall further discuss later.



Fig. 4. Ainu fish skin attush. 19th century. Sapporo University Museum. Sapporo, Hokkaido, Japan.



Fig. 5. Painting it in a negative form with white chalk on black paper. Part of Orit’s “toolbar”.

The coat at the centre of this case study, and the focus of Ran’s project, is an Ainu man’s fish skin attush from Sapporo University Museum in Hokkaido, Japan (Figure 4). Fish skins used in the manufacture of garments like this one were softened by being beaten with a wood mallet after they were dry. This coat, which has

wide kimono-like sleeves, reaches to the knees. It is constructed of rectangular rows of nearly whole salmon skins. Since each skin, when opened flat, narrows toward the tail, there is a triangular gap between some pairs of skins. These gaps are filled with separate pieces of skin. The design of this coat has carefully worked with the shape left by the removed fish's fins, filling the holes left by the fins with lighter fish skins to create a pattern. Despite the many pieces of fish skin used, a careful effort at matching has assured a uniform colour for the garment. There are, however, many places on this robe where small, irregularly shaped pieces of fish skin have been used to fill oddly shaped areas. Where the individual skins meet one another, an overcast stitch is used. On the front opening, a double strip of black dyed quilted cotton cloth has been sewn. There is also a band of black cotton at the cuffs and across the bottom. There are finer or more worked examples of other Ainu fish skin robes, but this is a very utilitarian piece of workwear, as befits the F4\*3D fashion course.

### ***Workshop Content***

The structured framework for the study of this coat was provided by the F4\*3D Fashion course at Shenkar University. The course is inspired by the quotation from 19th century architect Louis Sullivan: "Form Follows Function", in this case "Fashion Form Follows Function" (Sullivan, 1988). This course, unique in the university's syllabus, eschews fashion to focus exclusively on workwear. Since workwear is designed for functionality and performance rather than aesthetics, it can be construed almost as anti-fashion. Perhaps it is more 'antidote', rather than just 'anti'. Utilitarian, functional and robust, workwear is designed and constructed to withstand and endure. There is no planned obsolescence here. Innocent of fashionable elements, it is outside fashion, and so can outlast it. Having no need for excessive volume, frills or ornamentation, workwear is made more economically, more ecologically than fashion wear. Its form, stemming from its function, is equally more essential, less frivolous – not to beautify or denote status, but to aid the worker in his operation, or protect him from its dangers. In this age of climate crisis, of apparel ambivalence, of fast fashion, of an outmoded, unsustainable six season year, the essentially fundamental, functional simplicity of workwear speaks powerfully.

The Fashion F4\*3D course has been taught in Shenkar's fashion design department for seven years, by fashion designer Orit Freilich, industrial designer Ran Kasses, and technician specializing in pattern cutting and sewing, Debbie Elhayeni. The course provides a broad vision, combining industrial and conceptual design methodologies, bringing an industrial perspective to a fashion study of technical apparel.

### ***Workshop programme***

The workshop was 3 months long and included different activities:

- Sustainability background Introduction
- Cultural appropriation
- Historical fish skin artefacts in international museums

- Shamanistic aspects of fish skin
- Sketchbook development.
- Power Point Presentation including sketches, fabric samples, paper-patterns, toile, and 30 digital multi-deconstructed collages and photographs.
- Pattern cutting of a historical fish skin robe replica
- Fish skin Digital Printing

In the workshop, the students choose an item they have researched that represents a working garment dating back to the 19th century. From this original they make an exact replica. The replica is made based on the original patterns as gleaned from a study of the object itself in the Rose Archive at Shenkar or taken from images in books and the internet. The process of making the replica is relatively short: 3-4 weeks. The students develop a design process considering a combination of both conceptual and practical methods.



Fig. 6 and 7. Hand drawings of AINU fish skin robe and fish skin scale details by Ran Graber.

Producing an exact replica of a specific item of a utility clothing worn by a craftsman/professional, the students examine how its design-derives from its function. The research is done through visual mapping. They first collect images of the craftsman/worker wearing his or her designated garment and examine—the purposes for which the clothing has been evolved. Does it protect or facilitate? What are the materials from which it is made and what the variety of elements that allow it to fulfil its intended functions?

Usually, the students isolate a clear photograph of the chosen garment (figure 4) and transcribe its negative form with white chalk on black paper (Figure 5). The critical deciphering process begins as dimensions are plotted from hand drawn studies of photographs of the original garment (figures 6 and 7), from which a paper pattern is developed, then worked, draped and adjusted on the mannequin. This is used to create a

toile, (figure 11) and then finally, the replica itself. In the final review, they present their replica and the study, detailing the specific form and function of the garment, its component materials and its continued use, modification, or abandonment in the present day. They also analyze the difference between their replica and the original.



Fig. 8 and 9. "Toolbar" developed by Orit working with collages. Collages by Ran Graber.

This case study follows Ran Graber's remaking of the Ainu fish skin coat. Taking place during stringent covid lockdown, geographical distance was critical but irrelevant. Neither he, nor his tutors could travel to college, but they could unite through zoom, virtually, at a moment's notice, whether in Tel Aviv or London. Adversity promoted resourcefulness and limitations became advantages. Without external distractions, Ran's work with his tutors was intensely focused. He received a unique "toolbar" that Orit had developed for practicing his design skills by working with collage (Figure 8 and 9) and establishing all kind of textures "that mimic" the original replica (Figure 7) besides bringing some fabrics in order to expand as much as possible the student's range of craftsmanship and his creativity in order to offer an outfit inspired by the Ainu replica he made with his own hands.

During the creation of the workshop content, the tutors' concerns were as much pastoral as academic. It was vital not only to impart knowledge to Ran - all the information of the Ainu coat came from the photographs Elisa had taken when she visited several museums in the Hokkaido Island of Japan - but to keep him inspired and connected during a period when students were suffering from the lack of classroom interaction that afflicts remote learning. This online platform provided excitement, connection, a new fish skin craft expertise

and the opportunity to engage with remote Ainu knowledge, as well as with museum artefacts, bringing an awareness of ancient traditions to modern industrial concerns.

Both Central St Martins and Shenkar maintain an approach to fashion education based on the development of manual skills of drawing and illustration, paper patternmaking, sewing, fabric manipulation, draping fabric on mannequins, silk-screen printing, and hand-dyeing. The student, confined at home with limited materials and technologies, was prompted to reconsider, recuperate, and upcycle, and so to reflect on overconsumption, waste and the scarcity that follows. The practical prompted the philosophical. Using materials available from home created a reciprocity between craftsmanship and innovation, producing by hand new materials (Mallon, 2020).

Just as the tutors' concerns were as much pastoral as academic, so too this F4\*3D course is designed not only to reproduce, but to prompt analysis and understanding of intangible concepts – sustainability and cultural appropriation.

The workshop was part of the EU Horizon 2020 funded project FishSkin, 'Developing fish leather as a sustainable alternative within the fashion industry'. The project proposed the sustainable development of fish skin as an innovative raw material for the fashion industry to encourage more sustainable fashion practices.

The main project objectives were:

- Helping Higher Education students engage in sustainability by developing fish skin inspired shapes and material samples as an environmentally responsible alternative material for fashion.
- Bringing together sustainable methods from fashion design and traditional crafts to foster the international exchange of knowledge.
- Identifying tools about best practice in fish skin craft and testing the ideas at fashion higher education institutions internationally.
- Preserving and disseminating the Ainu cultural heritage connected with fish skin.

This project described the methods of sustainable material engagement and the full immersive experience through an online teaching approach. The paper analysed its findings in order to recommend transferable skills for educational models, for this project to be further disseminated.

### ***Sustainability: a background Introduction***

The student was briefed with in an introductory session providing inspiration, basic information regarding ethics and sustainability of fish skin. An important objective was to place this project in the frame of alternative sustainable materials. In order to adhere to this strategy, a comparative study of different leathers and fish leather was made. Comparing fish leather with other sustainable materials highlighted aspects of

the climate crisis, the loss of biodiversity, and the depletion of finite resources. Contemporary issues around animal rights and the possibility of replacing exotic leathers from endangered species with fish leather were also raised and discussed. Fish leather as a food waste by-product and its high market value was equally mentioned. Fish leather's environmental, aesthetic, technical and social characteristics were shared and compared with vegan, exotic (crocodile/snake) and faux leathers as alternatives. Suggestions for further reading and research were given to the student.

### ***Fish skin and Education for Sustainable Development***

This workshop took inspiration from sustainability education in fashion, emerging from ecological and participatory research at the Centre for Sustainable Fashion, London College of Fashion. It followed CSF's six pedagogic principles for sustainability education through practice (Fletcher, 2013). These are futures thinking, critical and creative thinking, participation and participatory learning, systemic thinking, interdisciplinarity, and place-based learning. The workshop followed academic scholarship by Fashion sustainable researchers Dilys Williams and Kate Fletcher (2010, 2013) on how to embody sustainability content in fashion Higher Education practices drawing connections between people and nature. The study drew on their approach to a fashion education that is oriented towards creative participation in social, and environmental aspects.

### ***Cultural appropriation***

Issues of cultural appropriation were carefully considered and discussed during the workshop. The intention was to preserve and disseminate the Ainu cultural heritage connected with fish skin, but in so doing, it was essential to try to avoid any form of cultural appropriation. This refers to the taking of someone else's culture— their intellectual property, artifacts, art form, style —without their permission. It is a fraught issue. The term culture has the potential to embrace an infinity of aspects - dance, dress, music, language, folklore, cuisine, traditional medicine, religious symbols – that are increasingly intangible. What is culture? And who decides who is entitled to give permission for its appropriation? If a member of a relatively privileged group writes a story about a member of a marginalized group, this may be an act of cultural appropriation and therefore could do harm. A wide variety of acts and practices are condemned as cultural appropriation (Scafidi, 2005).

Fashion has been criticized for constantly taking inspiration from Indigenous communities, from materials to designs. Fish skin knowledge sharing does have the potential to be seen as detrimental to Indigenous communities since it is their own traditional knowledge passed down by many generations, -which they feel possessive about.

There are always concerns around cultural appropriation; this process was no exception. The researcher Elisa Palomino mitigated these by openly discussing the use of fish skin with the student in a respectful manner.

She had used Shaginoff's methodologies of Land Acknowledgment (Shaginoff, 2021) publicly recognizing the Ainu Indigenous peoples whose traditional fish skin craft was studied. In her guidance of the student, she covered: -recognizing the Ainu Indigenous Peoples, consulting with Indigenous-led organizations, educating oneself on the Indigenous histories, their resilience and the current work Indigenous Peoples are doing for their tribal communities.

The workshops and the research behind them attempted to pass on the fish skin craft from Arctic Indigenous communities, preserving and protecting them. The workshops have been envisioned as the beginning of a continuing and expanding discourse on the future of fish skin craft. Collaboration of the researcher with Indigenous partners has enormously enriched the understanding of this material. The experiences gained continue to guide and inform the methods and attitudes she uses and will continue to use working generally and with Native communities.

Fashion can be(come) a space of empathy, a vehicle for connection. Great artists maintain the quality of their awareness of others, the responsiveness to other people, what it is like to live in other people's realities. We need to acknowledge how connected we are to one another and to hold the vision of a shared humanity (Morton, 2020). Indeed, fear of cultural appropriation could lead to division, isolationism, xenophobia and even racism. We need to learn from each other, to share knowledge and resources. The climate crisis, from which we will all suffer, was not caused by the actions of the Indigenous communities but by the non-marginalized societies. Moreover, it is precisely these Indigenous communities that are the first to suffer the impacts of the climate crisis that they did not cause. These communities have a knowledge and respect for the environment that we have lost, thereby risking the loss of the environment itself. We need to learn from them, and we need to start now.

This fish skin craft is only one of many examples of an Indigenous model providing an environmentally sustainable alternative to current practice. The move towards sustainability in fashion practice, via dissemination of such knowledge, without cultural appropriation, is a primary concern of this case study of Ran's project.

We learned from Ran as he learned from us, from himself and from the Ainu. This project was never a simple xeroxing of the original workwear – but the current global situation bought unforeseen consequences.

### ***Pattern cutting of a historical fish skin robe replica***

Debby, the pattern cutting tutor, had to teach Ran how to develop the pattern of the Ainu robe online. Ran did not have paper to create his patterns or a dummy to try it on, nor, in the covid lockdown, was he able to obtain them. He had to think frugally, to maximize the resources available to him. He sat down with the photographs of the Ainu robe to make the pattern by himself at home. Without pattern cutting paper, he used leftovers from photocopies or newspaper taped together to create a huge bit of paper, from which to cut the patterns. He took pictures of the pattern on the floor and shared them with Debby online. The Ainu

pattern is a relatively easy one, so it was not a particularly complicated task. With calico leftovers from previous projects, he created the Ainu toile (figure 11). Without a mannequin, he fitted the toile on his own body. He handpainted fish skin texture on each calico pattern piece mimicking the scales of the salmon (figure 10). He turned adversity into advantage, and overcame want with an abundance of creative, freethinking frugality - like the Ainu peoples, whose coat he was studying.



Fig. 10 Hand painting of the fish skin texture on each calico pattern piece. Fig. 11. Ainu fish skin toile and pattern pieces by Ran Graber

He also brought to the project and garment an unexpected spirituality, customary for the Ainu, unprecedented in Tel Aviv.

### ***Shamanistic aspects of fish skin: the kamui***

The Ainu of Sakhalin Island and northern Hokkaido are spiritually connected with the multiform spiritual entities that surround them, whom they call kamui (spirits). As many hunter-gatherers and north-eastern Siberians, their religion revered god-spirits, who would visit the Earth in the forms of flora, fauna, and forces of nature (Geoffroy, 2018). Shamans were among the most important people in the Ainu populations, as intercessors with the god spirits. The Ainu Indigenous Peoples embroidered and applied design motifs on traditional fish skin garments to grant the wearer protection against evil spirits. On early Ainu salmon-skin attush (Ainu robe) garments (Figure 3), women embroidered design motifs placed on the borders of all the openings of the traditional tunics (collar, arms, legs, front fastening, and hem) and all the edges to prevent evil spirits from entering the body openings. The motifs had structured symbolic references - the upper borders represented the Upper World and the motifs placed there offered protection in that direction, the hem represented the underworld or underwater world; and the central parts represented the world inhabited by humans (Krutak, 2012). These clothes offered as much spiritual as practical protection - and the Ainu saw no distinction between the two.

The original idea of the fish skin workshop had been to make a replica of a historical item of workwear that enabled the wearer to function and/or protected him whilst so doing. In choosing to reproduce a 19th century Ainu hunter coat of fish skin (Figure 4), Ran was prompted to reflect on the practical usage of the

coat, how to transform it into protective gear. During the Covid lockdown, the student's mother was working as a nurse in a local hospital treating Covid patients, in the frontline and at high risk. She was afraid of getting infected with the disease and transmitting it at home. And Ran was scared for her. He shared with us tutors, his anxiety about his mother's health.

Elisa told him about Ainu shamans and the spiritual roles of fish skin robes. Ran decided to include spiritual aspects into the coat he was making to create a powerful fish skin robe like the ones worn by shamans in the past, with protective properties - in this case against Covid. The student used one of his mother's health care personal protective equipment gowns (Figures 12 and 13) as a base onto which he applied the traditional Ainu fish skin shapes. This bought him to question what makes people feel safe, and how his mother felt wearing this gift from him. Ran was able to bring spiritual aspects of the Ainu and past shamanic traditions into contemporary context. His isolation in lockdown acted like a shamanic initiation into fish skin craft.



Fig. 12 and 13. Health care personal protective equipment gown with Ainu fish skin shapes drawn into it by Ran Graber.

During the Covid lockdown, students did not have the required materials and teachers were not there to help them physically. When you have limited resources, you need to find alternatives and become very resourceful. Likewise, Ainu Indigenous Peoples lived in Sub Arctic regions thriving in subsistence economies where resources were precious, and they used fish skins in a resourceful and efficient manner. This was also an ethical position made out of respect to the animal (Palomino, 2020). Once the lockdown restrictions were finished, the student returned to the classroom at Shenkar. His project had been very focused when he was at home but when he came out of lockdown, he lost a lot of focus and interest in the project. This is symptomatic of humankind. When you have more resources, you stop being so careful with them. We knew this already, but the case study taught us to recognise it once more.

### ***Fish skin Digital Printing***

Once the Covid lockdown eased, Ran was advised by Orit Freilich to make a decision whether to use real fish

skins for the final garment that he was developing. Orit made the link between the student and the Icelandic tannery Nordic Fish Leather for the purchase of the fish skins. Afterwards Orit made a liaison between the student and the company Kornit digital printers (an Israeli company who are part of the EU Horizon 2020 project, Fishskin) to print his designs on fish skins from Nordic Fish Leather (Figures 14 and 15). Printing the fish leather goes against the utilitarian principles of the F4\*3D course but it brings it into a new arena and makes it part of the modern world.

Kornit printing technology is based on a subtract method of wet-on-wet technology. They provide a pre-treatment spraying water with some ingredients changing the viscosity of the inks and then printing the ink. The sprayed water promotes the absorption of the inks. Fish leather had very good absorption. There is then a curing process using dry air temperature. The usual temperature used for printing polyesters is 120 degrees for 20 minutes, but this temperature is problematic with fish skin as, due to its collagen content, high temperatures damage the skin and promote shrinkage. Kornit optimised the temperature down to 90 degrees to cure the inks without further shrinkage.

Kornit uses another technology called FOF printing ink and their own trademark ingredients. FOF technology can print only on light materials using a light ink on the roll-to-roll machine. FOF gives the advantage to print on non-absorbed skins. The fish skins (figure 14) were printed for free as part of the EU Horizon 2020 funded project FishSkin, 'Developing fish leather as a sustainable alternative within the fashion industry'.

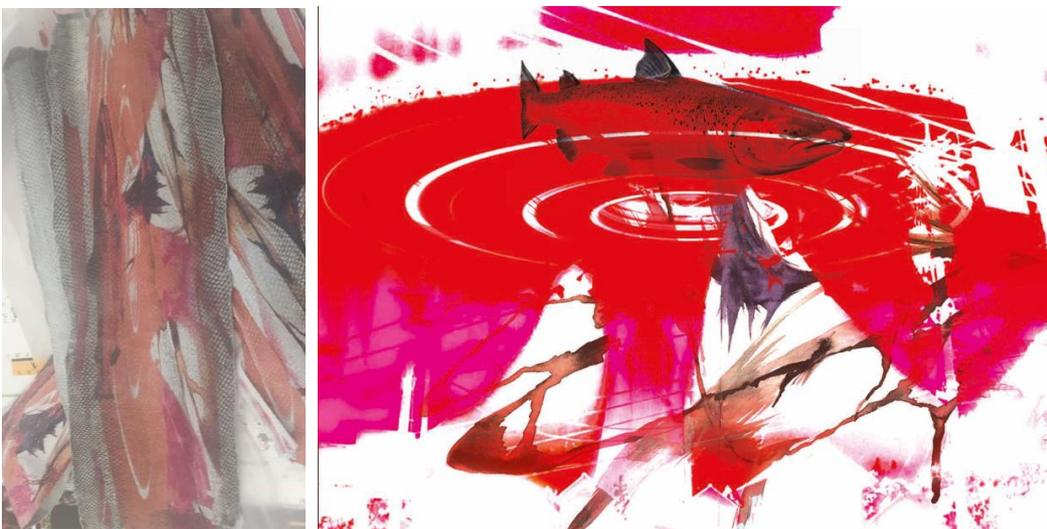


Fig. 14. Digitally printed Fish skin using Kornit's FOF technology Fig. 15 Salmon print by Ran Graber.

## ***Conclusions***

The increase of communication and availability of different individuals across the planet during the Covid lockdown has provided the participants with a closer relationship to each other and with nature. The crisis has brought about a shift in the perception of nature and the role of humankind within it, as keeper, rather than despoiler. Ainu Indigenous Peoples have much to teach us in this respect, and now is surely a time for

them to be heard, and for us to listen. Traditional Indigenous knowledge and resilience stems from paying attention and being a part of your environment, experiencing and learning from it collectively (Clement 2020).

To navigate perilous times, ancient shamans drew inspiration from nature, harmonising the fire, water, earth, and air elements. The Ainu fish skin workshop has offered the student and tutors a way to help us through these challenging times of disorientation, distress, and challenge, strengthening our connection with nature, and with matters reaching even beyond the realm of science.

The Ainu fish skin workshop has challenged and merged the digital and crafts environment during the pandemic. Younger generations from any background must be equipped both with traditional skills to thrive culturally and with digitalization skills needed for success in the modern world (Chaussonnet 1995). The digital needs to accompany the analogue, the two working together, rather than in competition.

The workshop has proposed taking the best both worlds have to offer. In this digital age, it can make new and sustainable connections between the virtual world and traditional craft. It can bring a spiritual understanding to the practical. It has allowed the student and tutors from different backgrounds and nationalities to come closer despite physical distance and pandemic lockdown, forging life-enhancing connections in a time of isolation. This online fish skin workshop created a new form of communication and learning when classrooms, museums and libraries were closed.

It sought to inspire Academia involved in the development of sustainability and craftsmanship within their curricula. We hope that this transformative teaching and learning experience may be absorbed and repeated in other practices, which in turn may contribute to public debate on sustainability issues in the fashion industry (Fletcher & Williams, 2010).

Development of sustainability within the curriculum has been identified as a high priority (Reid 2011). The hope is that the observations gathered through the workshop will help us understand how to embody craftsmanship and sustainability content in fashion Higher Education practices.

Through the workshop, the student has built on the knowledge, skills, and traditions of Fish skin technology, engaged in learning activities based on traditional ways of knowing and learning, demonstrated awareness and appreciation of natural resources, and began to understand how humans and nature interact.

### ***Future Work***

Now that this project is over, we can consider its longer-term aim and potential legacy. The findings could be delivered in the shape of design workshops for Higher Education students, aligning universities with the United Nations, in actively supporting principles of sustainability. The project could be implemented through

a programme of workshops for Fashion Higher Education students in those areas where fish skin leather originated (Scandinavia, Alaska, Hokkaido Island, Japan, and Siberia). Craftspeople from ethnic minorities could pass down the endangered fish skin craft techniques and would benefit from preservation of their craft. Students will benefit from education in craft and sustainability – the world, and us with it, will benefit from any and every increase in sustainability.

Thanks to this project, the author Elisa Palomino has advanced knowledge on fish skin craft and has been able to deliver four more workshops developing methods of tanning fish skin in areas where traditionally fish skin was developed:

- Nordic fish skin workshop, Blondous, Iceland. This was a Workshop in collaboration with the fish leather tannery Atlantic Leather at the Icelandic Textile Centre with the participation of students from top Nordic Universities: Iceland University of the Arts, Royal Danish Academy of Arts, Boras University, Sweden; Aalto University, Finland and Central Saint Martins College of Art, UK and fish skin craftspeople Lotta Rahme. Funded by the Nordic Culture Fund and the Society of Dyers and Colourists.
- Nibutani Ainu culture museum, Hokkaido, Japan. Workshop on Ainu Fish leather craftsmanship with students from Japanese universities: Bunka Gakuen, Osaka Bunka, Kyoto Seika University, and fish skin craftspeople Shigerhiro Takano. Funded by FRPAC. Foundation for Research and Promotion of Ainu Culture, the Japan Foundation Endowment Committee and The Great Britain Sasakawa Foundation.
- Hezhen fish skin workshop, Workshop on Hezhen Fish leather craftsmanship with Chinese students from UAL and with Indigenous craftspeople Wen Feng You and Sun Yin. Funded by IAIA, the Jiejinkou Hezhen Village ethnic museum, the Hezhen ethnic minority craftspeople.
- Alutiiq Fishskin tanning workshop. Online workshop on Alutiiq Fish leather craftsmanship with Indigenous craftspeople June Pardue as a response to Covid 19.

Elisa Palomino In her role as BA Fashion Print lecturer at Central Saint Martins has shared the sum of this knowledge with her students and learned again from them in the process. They, in their turn, have been keen to disseminate this knowledge further amongst their friends and classmates and - as they become professionals - within the fashion industry. It has been a truly global project. She has created a series of fish skin craft workshops, in situ, bringing fashion students from Nordic, Chinese, Japanese, and American backgrounds to the specific Indigenous communities with historical evidence of fish skin production to learn from them and from each other. When the Covid pandemic rendered travel impossible, she made these workshops virtual. One such, is this case study.

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