Making and Growing *Washi* Paper Clothes: A Framework for Interspecies Fashion Design in the Anthropocene

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by
Daphne Mohajer va Pesaran

Supervisor: Dr. Takagi Yoko (Bunka Gakuen University)
Co-supervisor: Dr. Clemens Thornquist (Swedish School of Textiles)

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Declaration

I declare that this thesis was composed by myself, that the work contained herein is my own except where explicitly stated otherwise in the text, and that this work has not been submitted for any other degree or professional qualification.

Daphne Mohajer va Pesaran
January 2018

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Abstract

Climate scientists have identified the anthropogenic causes of climate change. The concomitant changes resulting from human action will likely usher us from the Holocene, which began roughly 11,000 years ago, into the Anthropocene. The ecological crises of the Anthropocene force fashion to reconsider its relationships with nature. Through an examination of community-based practices in Japanese papermaking, a framework can be developed for making and growing materials and forms that are contingent on relationships between local communities of humans and nonhumans. The Anthropocene calls for radical propositions for sustainable fashion design practices. In response, this study aims to develop a theoretical and conceptual framework for interspecies design in fashion. This dissertation found that two hierarchies underpin the unsustainable practices of the dominant fashion industry: the primacy of producer over consumer, and human over nature. Sustainable fashion research needs to address these hierarchies. This study showed that they are being destabilized by consumers who act as producers themselves and find ways to exert their agency over fashion's supply chain through practices that value collaboration, openness, and transparency. Outlined in this dissertation are the theoretical and conceptual foundations for interspecies fashion design in the Anthropocene—a form of design that addresses the ecological negligence of the dominant fashion industry. This study provides a framework for nascent fashion design practices that seek to bridge the biological, social, and technological in the Anthropocene.

Acknowledgements

This dissertation was made possible thanks to a research fellowship grant by the Japanese Society for the Promotion of Science under the category of Art in the Humanities, and is aimed at contributing to research on sustainable fashion (JSPS Grant number 16J2084), so first and foremost I would like to acknowledge the Japanese Government for the support to do this research. Thanks also go out to all interview participants who allowed me into their lives, and gave up precious time to answer my questions. Thank you for your generosity, and for sharing your memories and materials with me.

I would like to thank my thesis supervisor, Dr. Takagi Yoko for advising me to apply for the grant, and for motivating me to pursue a PhD. Thank you for giving me advice on all six drafts of the application, and for your continuing advice throughout the dissertation process. Navigating the minefield of writing a dissertation would not have been impossible without your generous guidance. I would also like to express my gratitude to Mr. Endo Hajime, the head of the administration at Bunka Gakuen University, for supporting me throughout my time as a student. His advice in applying for the JSPS grant—among other things—was invaluable. I also need to acknowledge the students of the Global Fashion Concentration who have taught me so much over the past five years. My thanks also go out to my subadvisor, Dr. Clemens Thornquist from the Swedish School of Textiles in Boras, Sweden. Your advice and support throughout the process has been enlightening and highly valued.

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This dissertation would not have been possible if not for my husband, Cameron, who supported me and gave me advice throughout the process of research and writing. Many dinners, tears, and great ideas flowed throughout the process, and it would not be the same with your input. Your questions, advice, and criticisms (!) helped me enormously.

Notes on Style

- The real names of some interviewees have been altered. For further explanation, please see Volume 2, Appendix 1, page 3.

- When Japanese words are romanized (written using English letters), the Hepburn System will be used. For example, elongated "o" sounds are written as "ō." All Japanese words are italicized on the first instance, and not capitalized.

- Any translation from Japanese to English, unless otherwise stated, has been done by the author.

- All figures were produced by the author, unless otherwise stated.

Glossary of Japanese terms

Romanization	Japanese spelling and pronunciation	English translation
-gami	-紙（がみ）	-paper
Aburagami	油紙（あぶらがみ）	Oilpaper
Chigiri-e	ちぎり絵	Collaged drawings made of ripped paper
Furusato	故郷（ふるさと）	Hometown or historic remains
Gampi	雁皮（がんぴ）	*Diplomorpha sikokiana* or *Wikstroemia Canescens*
Genshi	原紙 (げんし)	Raw, untreated sheets of paper
Haori	羽織（はおり）	Short kimono garment
Kakishibu	柿渋（かきしぶ）	Fermented persimmon tannin
Kakōhin	加工品 (かこうひん)	Sheets of paper with added finish
Kami	神　（かみ）	God; deity; divinity; spirit
Kamiko	紙子（かみこ）	Paper garment
Kanaiseishukōgyō	家内制手工業（かないせいしゅこうぎょう）	Cottage industry or at-home production
Konnyaku	蒟蒻（こんにゃく）	*Amorphophallus konjac*
Kōzo	楮（こうぞ）	*Broussonetia kazinoki* or *Broussonetia papyrifera*

Machikōba	町工場（まちこうば）	Small inner-city factory
Meibutsu	名物（めいぶつ）	Regional specialty
Mitsumata	三椏（みつまた）	*Edgeworthia crysantha* or *Edgeworthia Papyrifera*
Momigami	もみがみ	Kneaded paper
Monozukuri	ものづくり	The practice of making things by hand
Nagashi-zuki	流し漉き（ながしすき）	Draining method of papermaking
Neri	ねり	Mucous from the Sunset Hibiscus
Nuka	ぬか	Pickling solution made from rice bran, spices, and bacteria from human hands
Satoyama	里山（さとやま）	Cultivated woodland near mountain
Shifu	紙布（しふ）	Woven paper textile
Shōji	障子（しょうじ）	Paper sliding doors in Japanese-style homes
Shokunin	職人　（しょくにん）	Craftsperson
Sukibune	漉き船（すきぶね）	Papermaking vat
Tesukiwashikyōdōkumiai	手漉き和紙協同組合　（てすきわしきょうどうくみあい）	Handmade papermaking cooperative
Tororoaoi	トロロアオイ	Abelmoschus manihot
Washi	和紙（わし）	Japanese paper

Sites Visited

The following towns and prefectures are mentioned in the text (listed alphabetically).

Japanese	English Translation	Map Number
京都府綾部市	Ayabe, Kyōto Prefecture	1
福井県越前市	Echizen, Fukui Prefecture	2
岐阜県美濃市	Mino, Gifu Prefecture	3
埼玉県小川町	Ogawamachi, Saitama Prefecture	4
宮城県白石市	Shiroishi, Miyagi Prefecture	5
高知県土佐市	Tosa, Kōchi Prefecture	6

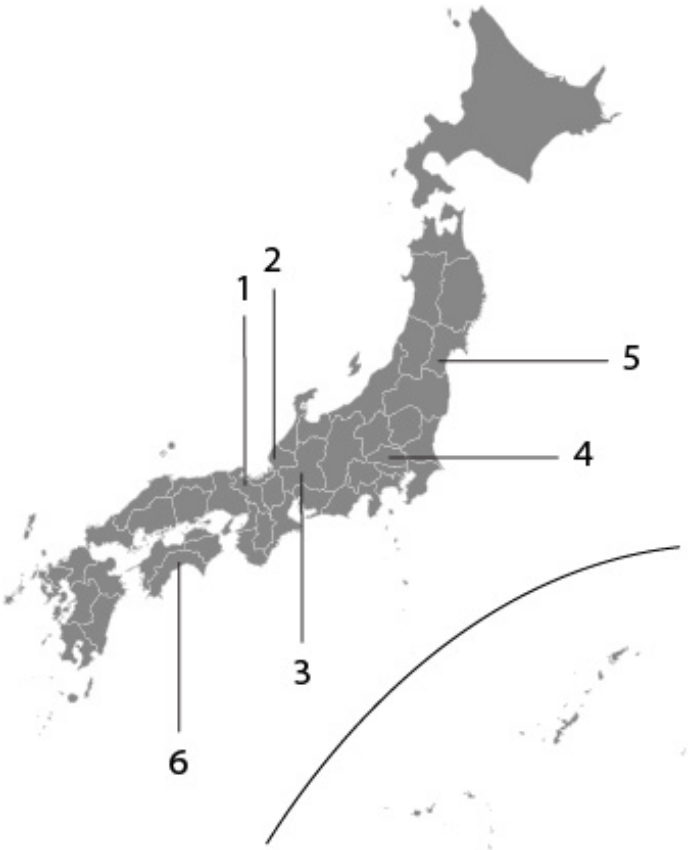

Figure 1 - Sites Visited

Introduction

Purpose

How can a socially just and environmentally sustainable alternative to the dominant fashion industry be developed through a fashion design method contingent upon local communities of humans and nonhumans? This dissertation asks this question in the context of the Anthropocene, a proposed name for the current geological age that is characterized by anthropogenic changes to the planet.

Taking an interdisciplinary approach, this study aims to build a theoretical framework that could form the basis of a fashion design practice which is contingent on a collaborative community of human and nonhuman actors. This research is timely, as innovations bridging social innovation, technology and biology—networking, machine learning and biotechnology—are resulting from new research questions and methods in art and design. Many of these innovations fall under the categories of "bioart" or "biodesign," and explore the ways an organism's morphology or behavior can be negotiated with to create design objects.

The theoretical and conceptual framework that this dissertation presents will be developed and critically examined through an analysis of such innovations as well as existing communal material- and clothing-making practices found in handmade Japanese papermaking. By doing so, this dissertation will contribute to the growing

body of research that promotes small-scale alternatives to the dominant global top-down fashion industry based on the reframing of relationships between nature and community.

Researchers focusing on sustainability in fashion are already calling for environmental and ethical reforms in the fashion industry. However, there is no agreed upon method about how to achieve these reforms, and no global standard on how to produce and sell apparel ethically. Literature on the topic identifies three key areas for possible reform: the supply chain, design, and end-use. Research on supply chain sustainability focuses on producers mitigating unethical and unsustainable practices, while research on sustainable design focuses on technical solutions such as novel cutting techniques that reduce waste. Research on end-use (fashion consumption) has been less clear. The literature shows that although responsibility is placed upon consumers to make ethical decisions at the purchase stage, they do not have access to the sites, materials and tools of production to be able to effect more substantial and lasting systemic changes.

This dissertation considers methods of consumer-led making that are situated in communities and local landscapes. With von Busch (2013), it asks: How can we build a community based around Do-it-Together rather than a Do-it-Yourself? And with Haraway (2007) it asks: Can these communities be extended to include nonhuman kin?

Thesis Statement

The Anthropocene has forced us to look closely at our relationship with nature. A framework for making and growing materials and forms for fashion can be developed that is contingent on relationships between communities of humans and nonhumans.

Problem Statement

In recent years, the anthropogenic causes of climate change have been identified. This will likely usher us from the Holocene—which began approx. 11,000 years ago—into a proposed new geological age: the Anthropocene. Researchers have shown that human action has caused a potentially irreversible effect on the natural systems and geology of the planet (Rosenzweig et al. 2008; Oreskes 2004; Thomas et al. 2004; Crutzen 2002)—but when this moment of change began is still being investigated. It may have begun 10,000 years ago during the agricultural revolution, when the first humans began cultivating monocultures; it may have begun during the industrial revolution in the late 18th century, when the human population rose, and urban centers grew as fossil fuels were harnessed; or it may be more clearly identified in the 1950s, during the "great acceleration" as resource use and urban development increased rapidly (Steffen et al. 2015). At the time of submitting this dissertation, the International Union of Geological Sciences has yet to decide on the official starting date or validity of the Anthropocene, but research indicates that human action has caused such extensive changes that we are already in a new geological age (Steffen et al. 2015; Smith and Zeder 2013; Crutzen 2002). Due to the dominant fashion industry's intensive use of natural resources, it must clarify its role in the

Anthropocene, and reconsider its relationship to nature. If humanity wants to thrive, research into sustainability becomes an essential concern for all industries, including fashion.

Dressing the body is a vital part of human life. Throughout human history, clothing has been necessary for protection from the elements, but also acted as a central signifier in human social worlds. Dress connects people to one another through culture, and can express socio-political, sexual, or psychological predilections (Barthes 1990; Bourdieu 1984; Flugel 1930; Veblen 1918). Dressing the body is now a multi-trillion-dollar, expansionist top-down industry that relies on economies of scale to keep the price of mass-produced garments low. The fashion industry—valued at around 2.4 trillion USD (Ahmed et al. 2017)—plays a problematic role in wider cultural and environmental milieus, due to often-unmitigated exploitation and unsustainable growth. Technological development is driving the global expansion of the fashion industry (Ruppert-Stroescu 2009), but the industry's vast scale not only makes it complex: in some cases, it damages the social and environmental fabric of the planet (Fletcher 2014).

Fashion—in its multiplicity of scales, iterations and definitions—has in recent decades been the subject of thorough interdisciplinary academic inquiry[1], with contemporary researchers building on the 20th-century canon of fundamental research into dress or fashion. This expansion of perspectives is reflected in an increase of courses over the past decade that promote environmental sustainability in

[1] See Rocamora and Smelik (2016) for interdisciplinary theoretical approaches to fashion.

fashion (Yang, Song and Tong 2017, 12; Joyner Armstrong and LeHew 2014; Fletcher and Williams 2013). Environmentally sustainable alternatives to the dominant fashion industry are needed (Catterall 2017), and new courses being developed in fashion and design schools encourage alternative, collaborative, and open methods, and are contributing to research on sustainable practices in fashion. Some of these courses include the Alternative Fashion Strategies minor at Parsons School of Design, the Material Futures MA at Central Saint Martins, the Center for Codesign (CODE) at the Royal Danish Academy of Fine Arts and the Sustainability in Fashion MA at ESMOD Berlin. These new courses may encourage fashion practices that are disruptive to the dominant fashion industry by empowering students to look critically at processes and products, and to challenge existing hierarchies that underpin unsustainable practices.

A critical look at the dominant fashion industry is timely as we enter the Anthropocene, where "Anthro-" refers to human activity and "-cene" denotes geological period. This new period emerges because the Earth—its geology, weather, lifeforms—has been altered by human action. Such a change challenges our definitions of nature: What does "natural" mean if humans, who are undeniably part of the natural world, have irreversibly affected the complex systems in which they live? What kind of new materials and methods can emerge from this state? How do technology, nature, and planetary responsibility intersect in this context? Such

questions open new pathways for exploration in fashion design, especially when enabled by disruptive new technologies. "Disruptive" is a key word here, as many of the solutions that are emerging in the context of the Anthropocene are adversarial to the traditional capitalist values and behaviors of fashion—values and behaviors which have contributed to our environmental and social problems. Disruptive innovation, according to Christensen (2017), "describes a process by which a product or service takes root initially in simple applications at the bottom of a market and then relentlessly moves up market, eventually displacing established competitors," and is characterized by "lower gross margins, smaller target markets, and simpler products and services that may not appear as attractive as existing solutions when compared against traditional performance metrics." Sanchez et al. (2017, 107) add that "Disruptive innovation [can be] understood as a type of innovation based on the impact on the market rather than on the technological trajectory." Small-scale and consumer-led disruptive innovation resulting from new technologies, such as advanced networking or 3-D printing, are important in the context of sustainable fashion because they are flexible and can promote new methods that larger companies may be slow to adopt. Christensen (2017) and Sanchez et al. (2017) suggest that disruption is a means of affecting both technological and social facets of an industry.

We have entered a new phase of industrialization and environmental awareness enabled by widespread information and communication technology that

follows a wider shift from mechanization to data and networks. This change affects how we live and work (Schwab 2016; Rifkin 2011), and has potential applications for disruptive innovations in the fashion industry. Synthetic biology is one technological domain from which ecologically aware disruptive technologies are emerging that, according to Collet (2015, 192), "could make a radical step-change for a positively sustainable model of manufacturing." By harnessing the potential of synthetic biology, fashion designers can develop methods that address the technological *and* social, where the "social" includes relations with and between nonhumans. The Anthropocene is evidence that the technological and social cannot be decoupled—it shows that, through technology, human actions have altered the Earth, and that environmental changes, in turn, affect social worlds of humans and nonhumans. This gives designers the opportunity to approach their work from a socio-technical perspective (Light, Powell and Shklovski 2017, 271).

The history of human culture is punctuated with technologies that have enabled us to grow and flourish, such as the plough, the abacus, the loom, the computer, the internet, tele- and microscopes, and the printing machine. The emergence of steam power and railroads during the late 18th and early 19th centuries paved the way for the proliferation of electrical grids and power lines, which, in turn, supported the development of mass assembly lines in the late 19th and early 20th centuries. Between the 1960s and '90s, computers, semiconductors, and mainframe

computing were developed, and only a few decades later, we find ourselves amid a "fusion of [...] technologies and their interaction across the physical, digital, and biological domains" (Schwab 2016, 8). Technology with superior processing power, using "artificial intelligence and machine learning" (Schwab 2016, 7), will be the hallmark of this technological shift. Developments at the intersection of computing and biology will likely not only affect how we live and work, but also impact the way we relate to our own bodies and nature itself. Futures researcher Carole Collet (2015, 192) argues that if synthetic biology stays on its "current trajectory," it may have the "same impact on our society as the Internet has had on our everyday experience in the past decade." Technological developments such as these necessitate the development of conceptual frameworks to ensure they are utilized in socially just and environmentally sustainable ways.

These technological developments are concurrent with a growing awareness that the modernist paradigm of progress and growth, built on linear cradle-to-grave material flows, is no longer sustainable, and this awareness is apparent in fashion design and research. Following the streamlining of garment production during the Industrial Revolution, the dominant fashion industry has utilized a top-down, hierarchical structure for production—a structure instrumental in generating growth. This structure is comprised of multiple interrelated hierarchies, but two have become particularly significant in the context of planetary change: the primacy of producer

over consumer and the dominance of humans over nature. Regarding the first hierarchy, producers limit access to the sites and processes that animate the dominant fashion industry. The second hierarchy enables extractivist, cradle-to-grave methods of resource use that relegate nature to a subordinate position (Caniato et al. 2012; Braungart and McDonough 2002).

The growth of the dominant fashion industry is sustained by these two hierarchies. To understand the producer-consumer hierarchy, phenomenological and epistemological limitations must be considered. Sites of production are rarely directly experienced or understood by consumers, and the source of raw materials is rarely evident in the final garment. The products of the dominant fashion industry are presented as "discrete, finished entities" (Anusas and Ingold 2013) disconnected from production sites or material sources; they are tethered to brand messages, rather than places or people. Despite the distance—in terms of knowledge and experience—between the finished products of fashion and their organic and labor-intensive origins, garments are closely linked to local ecosystems.

The materials of fashion play a large role in environmental impact of garments and accessories. Pritchard (2013), identifies that "Nike estimates that materials make up about 60% of the lifecycle environmental impact of a pair of trainers, whereas the manufacturing process accounts for about 25% and the remainder is split between transport, retail, office facilities, packaging, use and disposal." His findings show that

the bulk of the environmental impact of a pair of shoes rests in the growth, manufacturing and processing of materials. However, rather than developing new materials, we need new relationships with materials and the landscapes that generate them.

Developing sustainable methods in fashion requires taking a critical perspective on producers and consumers (Fletcher 2015, 19; Rissanen 2015, 201). This criticality may emerge from intersecting technologies—for example, where biotechnology meets textile research, or network culture meets biotechnology—that have the potential to upset dominant and damaging hierarchies. For example, developments at the intersection of biotechnology and philosophy are destabilizing the dominant human position and are opening new ways of engaging with the natural materials that make fashion. Wood (2016) and Nowakowski (2012) argue that the path to sustainability is contingent on a shift from a hierarchical to a holarchical society, in which all members are active, agential and engaged actors.

The traditional hierarchies underpinning fashion production are disrupted by consumers who are aware of the impact of their purchase decisions and are searching for less harmful ways to engage with fashion. Rarely, concerned consumers will become producers themselves, but more often this search ends by changing behavior and using different tactics when purchasing garments. Researchers and designers—such as Timo Rissanen & Holly McQuillan (2016), Safia Minney (2016), and

Kozlowski, Searcy & Bardecki (2012)—have suggested various design-led interventions that focus on sustainability but there is little research on how a consumer can effectively engage with sustainable practices beyond leveraging their purchasing power (Black 2012; Carrington et al. 2010; Black, Eckert and Delamore 2007).

Modernity is embodied in fashion not only through dress—new materials, shapes and colors—but also through structures of production and consumption, specifically the way the fashion industry transforms the natural world. Hierarchical relationships that facilitate subjugation and exploitation are not unique to fashion but have been longstanding practices in human culture, and may be the cause of future environmental problems.

Aims and Objectives

Aims

1. To inform the development of sustainable fashion design methods.
2. To develop a useful theoretical and conceptual framework that can inform an understanding of how disruptive technological and social innovation—biotechnology and network culture—intersect with fashion.
3. To reframe the relationship fashion design has with nature in a way that is more inclusive of nonhuman actors.

Objectives

1. To determine that hierarchical relationships—producers' dominance over consumers and humans' dominance over nature—exist in the way fashion is produced.
2. To develop a theoretical and conceptual framework that explores design methods that are oppositional to damaging hierarchies in the dominant fashion industry.
3. To examine papermaking from these perspectives:
   i) Collaboration, openness, and transparency (Chapter 3)
   ii) Extended communities (human and nonhuman) and localism (Chapter 4)

Research Questions and Hypotheses.

RQ1: *How are consumers reclaiming their agency in the fashion industry?*[2]

Hypothesis 1: Consumers are gaining awareness of the environmental costs of fashion production. As a response to this, they are seeking more agency, and technology is enabling this through novel production schemes in homes or communities. Consumers are occupying various ontological positions: hacker, maker, and (consumer-)producer.

The dominant fashion industry operates as a "black box," meaning that consumers are kept distant from sites of production or only permitted limited participation in the cosmetic design of products. Despite this, they are given the responsibility for the maintenance, repair

[2] This research question will be addressed in chapter 3.

and disposal of fashion items. Finding alternative consumption and production schemes could provide one path toward a more socially just and environmentally sustainable fashion industry.

Among consumers of fashion, concepts of openness, transparency, the commons, and community are coming to the fore. New small-scale and niche developments are appearing in design which embody this ethos. A study of both papermaking in small communities, and contemporary consumer-led production schemes may inform the development of collaborative making systems and, when paired with new products and developments in biotechnology, novel methods for fashion design.

RQ2: *How can fashion be designed and made in extended communities with nonhuman organisms?*[3]

Hypothesis 2: Considering the agency of nonhuman entities could be beneficial for developing a subfield of sustainable fashion design that explicitly prioritizes ecological thinking over human exceptionalism. There is a way of making clothing that uses the generative power of nature—i.e., morphology and behavior of organisms—to produce materials or forms.

The Anthropocene forces us to look at the effects of human progress on the environment, and gives designers the opportunity to redefine their practices. What new methods can be developed by fashion designers that consider social and technological innovation?

By applying theories about the agency of nonhuman organisms to handmade papermaking, a new approach to making sustainable fashion can be developed which embraces an embedded relationship with nature. This approach could lead to the development

[3] This research question will be addressed in chapter 4.

of an expanded notion of *terroir*—or the intrinsic local character—in cloth, and new methods for fashion design that blend the acts of making and growing.

Thesis Outline

Chapter 1, "Hierarchies in Fashion: Producer/Consumer and Human/Nature," begins to outline the theoretical and conceptual framework that underpins this dissertation. In this chapter, two of the fundamental hierarchies that the fashion industry is contingent upon—the primacy of producer over consumer, and human over nature—are discussed.

Chapter 2, "Designing Utopia: Bridging the Social and Technological," provides historical background for design at the intersection of the social and technological. A line is drawn connecting the writings of design theorists such as William Morris and Yanagi Soetsu to those who are exploring the implications of the Anthropocene on the design discipline, and onward to situate this study within the burgeoning field of speculative design.

Chapter 3, "Do it Yourselves: Consumer Agency Through Community," outlines the ways that consumers are upturning the producer-consumer hierarchy using the values of collaboration, openness, and transparency. These values are explored through contemporary examples and an examination of five papermaking communities in Japan.

Chapter 4, "Growing Fashion Through Relationships with Nature," outlines a method for material and form creation based on interspecies collaboration. Localism and placeness are used to understand how a textile can emerge from unique relationships between humans and the nonhumans in local landscapes.

Chapter 5, "Conclusion and Discussion," will summarize the findings of the dissertation. The conclusion section of this chapter synthesizes the results of the previous chapters in relation to the overall research aims. In the discussion, I will reflect on the

academic contribution the study makes, address its limitations, and suggest avenues for further research.

Methodology

As stated, the purpose of this research is to explore how a fashion design method contingent upon local communities of human and nonhumans can contribute to a more socially just and environmentally sustainable alternative to the dominant fashion industry.

This study uses a qualitative, holistic approach to investigate the two research questions. Taking an interdisciplinary perspective to the literature review and theoretical framework, Chapter 1 tests the validity of addressing the producer-consumer and human-nature hierarchies. Research questions were further investigated in Chapters 2 and 3 with data collected during site visits to six locations in Japan outlined earlier.

This research draws upon literature from a range of fields, including (alphabetically) animal studies, anthropology, architectural studies, art history, contemporary art theory, design studies, fashion studies, biology, philosophy, and science and technology studies (STS). While the dissertation adopted an interdisciplinary and multi-method approach, it is intended as a contribution to the growing field of fashion studies. The reasons for adopting such a mix are explained

further below, but are in line with a tradition in contemporary fashion research of incorporating diverse perspectives.

Fashion Studies

Fashion studies, though a legitimate area of academic inquiry, is still young. Until recently, scholarly studies on fashion were undertaken by researchers in a range of fields who embraced multiple methodological frameworks and perspectives. Kawamura (2011; 2004) and Jenss (2016) have shown that fashion studies is an interdisciplinary field that utilizes a wide range of methods of inquiry to approach questions surrounding the systemic, abstract, social, and economic phenomena of human dressing. The scholarly study of fashion, particularly its effect on culture, has been undertaken by researchers since the middle of the 19th century, including seminal contributions in diverse fields including: economics (Thorstein Veblen in 1899), semiology (Roland Barthes in 1967), sociology (Georg Simmel in 1957), architecture and design (Wajiro Kon in the 1930s), and anthropology/material culture (Daniel Miller in 2012). Once such research was finished, however, most researchers moved to other topics, and fashion studies as a discipline remained nascent for most of the 20th century. Practice-based and -led research has also been employed as a method for academic inquiry at universities in Sweden and Australia, such as the Swedish School of Textiles and the Royal Melbourne Institute of Technology. The expansion and formalization of methods of inquiry for fashion is opening new definitions and questions in the field of fashion design. This dissertation, and its research questions, emerged from such a position.

Fashion design generally refers to the practice of designing clothing and accessories to meet a specific social or utilitarian need, or simply to be worn on the body as a form of play or self-expression. The term "fashion" denotes a consumer product that is subject to short-term changes and replacement, and not limited to body adornment (Pan et al. 2015). The dominant fashion industry creates surplus production, which leads to waste—both during production and at the end of the lifecycle of fashion products—and has been found to be unsustainable by scientists, economists, philosophers, theorists and other academics whose perspectives will be introduced throughout this dissertation.

From the 1980s, fashion research began to shed light on the fashion industry's impact on the environment and social spheres. In the past decade, research on fashion sustainability has adopted a much wider scale, and projects have been implemented to test theories in the real-world. As mentioned, in the face of environmental change on a planetary scale, the dominant fashion industry needs to change, and solutions that can make the industry more socially just and environmentally sustainable have been proposed from many fields. In the following chapters, these projects and proposals will be examined to explore the research questions.

Site Visits

Participant observation and semi-structured interviews were used to collect data about community-based material making practices in papermaking towns in Japan. The people I interacted with during this study were papermakers, paper clothing makers, curators, and community organizers in Japan. During a two-year period, I participated in or witnessed almost every step of the process of papermaking, and interviewed some of the only people in Japan who still produce paper clothing. Interviews were recorded (audio for all; video for some), and photographs and field notes were taken during and after all site visits. In chapters 3 and 4, interviews, observations and notes were examined and supplemented with a review of relevant literature. The full transcript of each interview (translated into English by the author) can be found in the Appendix. The places visited, in alphabetical order, were Ayabe (Kurotani) in Kyōto Prefecture, Echizen in Fukui Prefecture, Mino in Gifu Prefecture, Ogawamachi in Saitama Prefecture, Shiroishi in Miyagi Prefecture, and Tosa in Kōchi Prefecture. For a map that shows where the sites are located, please see page x.

The six sites were selected to form a wide-ranging view of the current practices of the industry as they relate to the research questions, but this was not a comparative study. The limitation of the method used in this research—spending days with each community in each region—is that there was not sufficient time to visit the vast number of papermaking communities in Japan to complete a comprehensive

comparative study of papermaking communities. However, this remains a potential research project for the future.

Papermaking in Japan has a history that spans more than 1,200 years, and the uses and localizations are diverse and number in the hundreds. The research sites were selected because they are places where the papermaking tradition is still apparent and locals continue to carry these traditions. The six chosen sites were selected because they each have a unique papermaking history and have been identified in previous literature as locations with public and communal facilities and active co-operatives—requirements for a study such as this, which focuses on collaborative forms of making. The goal of spending days at each site was to gain information that could not be acquired online or over the phone. Face-to-face meetings were vital in creating trust with papermaking communities to gain firsthand knowledge and experience of paper production.

Japan offers a unique site for thinking through the problems of humans, nature, producer and consumer and the role that making, design and technology play in disturbing hierarchies, such as those that underpin the dominant fashion industry. Papermaking will be used in this dissertation as a tool that invites a *recursive* understanding of the core research questions—recursive in the sense that the theoretical framework of the dissertation will help to reframe the handmade papermaking practice as "proto-biodesign," and that the examination of papermaking

as a case study will elucidate the research questions. In other words, through reframing an extant and longstanding practice like papermaking using contemporary qualities reflecting those of consumer-led innovation in the "sharing economy" and among bio-arts and -designers such as collaboration, openness, and transparency, this study helps to understand and potentially shape nascent design practices that seek to bridge the social and technological. Studies of localism in rural craft communities contribute to an understanding of ways of living that can bridge the old and the not-yet-apparent[4].

Indigenous Knowledge

This study looks at longstanding craft communities on the fringes of mainstream material production that in rural or semi-urban areas of Japan. It is important to acknowledge that the author of this dissertation is a Canadian researcher who is writing about Japan after having lived in Tokyo since 2008. The author has a Western bias, but has attempted to take non-Western references and perspectives into account.

Japan has piqued the interest of many foreign scholars, and its craft practices have been the subject of ethnographic studies (Hareven 2002; Moeran 1997). Ethnographic research that seeks to convey knowledge and ways of living from rural

[4] Chapter 1 provides more information on why washi has been selected as the case study, as opposed to other traditional Japanese material-making practices.

locations risks falling into the pitfalls of expectation, and projecting potentially damaging or misleading expectations about rurality on research subjects in ways that could be described as orientalism (Said 1978). Outside Japan, the famous 1972 ethnography, *Chronicle of Guayaki Indians,* by anthropologist Pierre Clastres, for example, was highly criticized for being romantic, reductive, and "othering," yet Anderson's (2005) more recent study of the reciprocal care relationship between Native Americans and the Californian landscape is highly regarded, and this may reflect the shifting social mores and perspectives that inform scholarly research on indigenous people. The study of indigenous or traditional knowledge systems—also called "native ways of knowing" (Barnhardt 2008)—can be problematic, and needs to be approached with caution. In the case of this study, reflexivity and an awareness of my own cultural biases and limitations was a constant aim in both executing fieldwork and in reflecting on the results.

Studies of indigenous ways of living and knowing have been undertaken to understand the material entanglements between indigenous people and their local landscape and, specifically relevant to this dissertation, to develop contemporary methods for sustainability (Agrawal 1995, 413; Gadgil, Berkes and Folke 1993). Studies of indigenous resource management (Anderson 2005), and particularly the use of endemic plants and materials (Devotka et al. 2017) have proven especially useful for this dissertation, especially in light of Mgbeoji's (2006) earlier research into

the issues surrounding "biopiracy." This relates to the global forces driving resource extraction that are generating new debates about the ownership and appropriation of not only indigenous knowledge, but also "genetic resources" (Mgbeoji 2006, 1) such as plants. The importance of the legal, ethical, cultural, economic and biological issues that intersect in studies of indigenous knowledge systems cannot be overstated, and these issues multiple and become visible as the dominant fashion industry expands globally. The scale of production of the dominant fashion industry has been shown to disrupt the indigenous textile and apparel industry in not only the sites where garments are produced, but places such as Zambia that receive large donations of second-hand clothing (Tranberg Hansen 2000a; 2000b).

Barnhardt's (2008) study of a 10-year effort to reintegrate indigenous knowledge into the education system in Alaska shows that a shift can take place that employs indigenous knowledge systems as ways of engendering stronger relationships between community members and their local landscapes. The author claims that indigenous ways of living serve as the basis for a

> ...pedagogy of place that shifts the emphasis from teaching about local culture to teaching through the culture as students learn about the immediate places they inhabit and their connection to the larger world within which they will make a life for themselves. (2008, 113)

Indigenous ways of living in the world According to Semali and Kincheloe (1999, 3) —who also argue for the inclusion of native ways of knowing into the academy— reflect the "dynamic way in which the residents of an area have come to understand

themselves in relationship to their natural environment and how they organize that folk knowledge of flora and fauna, cultural beliefs, and history to enhance their lives." While Semali & Kincheloe offer an approach to understanding indigenous knowledge, they do not completely clarify some key questions about it: When does indigenous knowledge become indigenous knowledge—is it tacit or explicit? How are these forms of knowledge made? And who holds the rights to deploy this kind of cultural knowledge[5]? These questions were in my mind as I met with papermakers who were enacting 1,200-year traditions. While they use similar tools to their predecessors, they do not live in an anachronistic bubble, and they engage with the materials of the world in much the same way as any other contemporary individual. This chronological duality—performing actions located in the distant past *and* in the present—is one of the reasons that papermaking can be used in this study to construct a bridge between traditional ways of making and contemporary issues in the fashion industry. The other reason is that, in papermaking the fundamental hierarchies problematized in the next chapter this study—producer over consumer and humans over nature—take different forms from their manifestations in the dominant fashion industry. Contemporary papermaking areas in Japan, particularly those with community structures such as the six selected for this study, are a robust

[5] Cultural appropriation has been identified as a key social issue especially in Western Europe and postcolonial nations such as Canada, Australia and the United States (Tsosie 2002). In Japan, cultural appropriation is a multifaceted phenomenon with many stakeholders, and though a thorough examination is beyond the scope of this study, care was taken to ensure the cultural knowledge of the participants in this study was not taken and mobilized inappropriately.

source of data beneficial to discussions of community, collaboration, openness, transparency, placeness and localism. These discussions will take place in chapters 3 and 4 of this dissertation.

Chapter 1 - Hierarchies in Fashion: Producer/Consumer and Human/Nature

Aims of Chapter

This chapter outlines the theoretical and conceptual framework the underpins the study. Fashion as an economic and social system is supported by several hierarchical structures of power: class, gender, and social capital are all part of the industry. To meet the research aims and objectives set out in the introduction, this dissertation only deals with two fundamental hierarchies in fashion: the primacy of producer over consumer, and the dominance of humans over nature.

In this chapter, these two hierarchical structures will be discussed to promote a method for fashion design that is predicated on human and nonhuman communities.

1.1 Hierarchies

1.1.1 Hierarchy and Holarchy

Hierarchies—rankings based on authority, status or power—exist everywhere. Arthur Koestler, in his 1967 book *The Ghost in the Machine*, summarizes this phenomenon:

If we look at any form of social organization with some degree of coherence and stability, from insect state to Pentagon, we shall find that it is hierarchically ordered. The same is true of the structure of living organisms and their ways of

functioning—from instinctive behavior to the sophisticated skills of piano-playing and talking. And it is equally true of the processes of becoming—phylogeny, ontogeny, the acquisition of knowledge. However, if the branching tree is to represent more than a superficial analogy, there must be certain principles or laws which apply to all levels of a given hierarchy, and to all the varied types of hierarchy just mentioned—in other words, which define the meaning of 'hierarchic order'. (1967, 47)

Instead of this, Koestler proposes a *distributed and integrated* hierarchical system called a "holarchy." While a hierarchy has an absolute top and bottom, and materials, ideas, and power flow from the top down, a holarchical system can take many shapes. A holarchy is comprised of holons[6]—small clusters of individual parts or "sub-assemblies" (46). Even the human is a holarchical system, or an "integrated hierarchy of molecules, cells, organs, and organ systems" (1967, 50), and they are each part of a whole, or larger social systems and subsystems. Koestler's insights on parts and wholes is useful here to frame the position of the consumer in relation to the producer:

A 'part', as we generally use the word, means something fragmentary and incomplete, which by itself would have no legitimate existence. On the other hand, a 'whole' is considered as something complete in itself which needs no further explanation. But 'wholes' and 'parts' in this absolute sense just do not exist anywhere, either in the domain of living organisms or of social organisations. (1967, 48, emphasis in original)

Following Koestler, the ontological position of a consumer in this sense is not only as "part" of the "whole" of consumption, but as "wholes" or holons, i.e., "nodes on the hierarchical tree which behave partly as wholes or wholly as parts" (1967, 48). The

[6] Holon comes from the Greek *holos*, meaning whole, with the suffix -*on* which, as in proton or neutron, suggests a particle or part (Koestler 1967, 48).

distributed structure of the dominant fashion industry is comprised of several mediating holons. In the context of this study—which questions the lack of consumer agency in the fashion industry—the "producer" is not simply one person, or even one organization.

Adopting Koestler's holarchic perspective suggests that the dominant fashion industry is comprised of holons that mediate the relationship between the producer and consumer—factories, buyers, distributors and retail managers, which become a holon or holons in the holarchy of a production and distribution chain. Holarchic systems theory has been developed into a normative manufacturing system by Van Leeuwen and Norrie (1997, 86), who describe a system of holons that "form distributed, reconfigurable virtual factories, in which humans, machines and programme modules interact in dynamically formed clusters." The framework outlined in this dissertation proposes that consumer-led communities can behave like holons, as both cohesive and separate entities. In Koestler's words, they:

> "function together, cohere, interact much more with each other than with other members of other holons...These ties of cohesion and boundaries of separation are both the result of shared traditions, such as the laws of kinship and the resulting codes of behavior. In their ensemble, they form a pattern of rule-governed behaviour. It is this pattern which lends the group stability and cohesion, and which defines it as a social holon, with an individuality of its own" (1967, 53).

Koestler's holons appear at varying scales—from the cellular to the social—and help to understand the agential potential of small groups of a specific kind of consumer,

who, connected using network technology, and emboldened by a moral ethic that considers ecological thought, may be able to develop alternative fashion design methods.

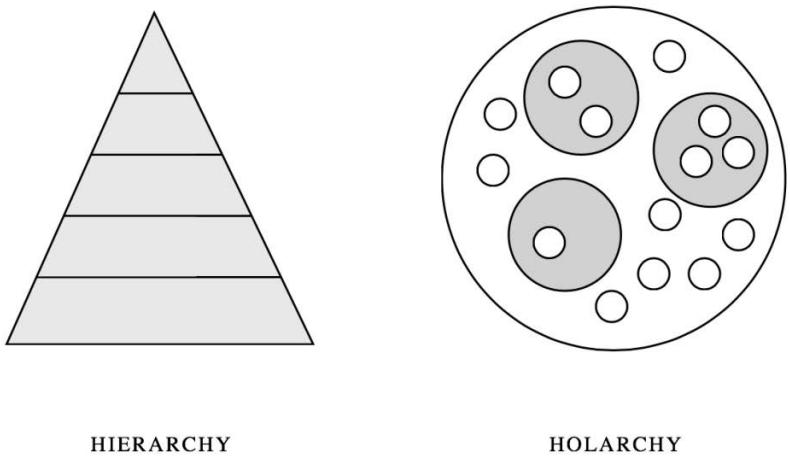

Figure 2 - Hierarchical and holarchical structures.

Insights from Stengers (2010) are useful in expanding this perspective to include the relationship between humans and nonhuman organisms in the global ecology. First, unlike Koestler, Stengers (2010, 34) does not picture the members of an ecology as distinct segments of whole system, but rather in a relationship of "entangled coexistence." Stengers' perspective on the intertwinement of humans and nonhumans shows that a holon—in this dissertation, a community of makers—can include more than people and involve the nonhumans in a landscape.

How can the concept of the holarchy and its holons contribute to a more ethical and sustainable method for fashion design and production? This dissertation

presents a case for disrupting hierarchies by promoting consumer-led and small-scale community-based material culture. Holons may be able to contribute to the formation of alternative production methods for fashion or, if they grew enough, could equal the economic power of the dominant fashion industry, or at least develop and test alternative methods for producing and consuming. As Koestler (1967, 49) writes, "[t]he two-term part-whole paradigm is deeply engrained in our unconscious habits of thought. It will make a great difference to our mental outlook when we succeed in breaking away from it."

1.1.2 Producer Over Consumer: Postcapitalist Design Practices

Criticisms of the dominant fashion industry are numerous, and concomitant with changing patterns of consumption (Catterall 2017). Many researchers are predicting the end of the late capitalist consumption model and are investigating alternative community-based consumption paradigms, such as collaborative consumption (Botsman and Rogers 2010), maker culture (Anderson 2012), and the commons (De Angelis 2017).

In his 2015 book, economist Paul Mason outlines the theory of postcapitalism, arguing that "replacing capitalism is no longer a utopian dream" (2015, 11). The central argument of Mason's book, *PostCapitalism*, is that new socio-economic models—new ways of living (2015, 20)—are emerging, and are adversarial to capitalism, the dominant economic model. The capitalist structure that Mason

criticizes is that of Neoliberalism, which he characterizes as "the doctrine of uncontrolled markets: it says that the best route to prosperity is individuals pursuing their own self-interest" (2015, 12). The emergent alternative models or "micro-mechanisms" (2015, 14) that Mason refers to operate with qualities of decentralization and collaboration—they "no longer respond to the dictates of the market and the managerial hierarchy" (2015, 18) and are being enabled by global networks. New technologies and access to information can "dissolve markets, destroy ownership and break down the relationship between work and wages," writes Mason (2015, 16). What he outlines is an alternative way of working, building, and consuming that is already emergent.

Mason indicates that while neoliberal capitalism has undeniably helped humankind in terms of development—citing "core information technologies" as an example (2015, 12)—it has exacerbated social and environmental issues at a global scale, and it is difficult to imagine a world without it: "it is easier to imagine the end of the world than to imagine a non-market … economy," he writes (2015, 250). Perhaps this is what the Anthropocene offers: a violent vision of the end of the world, and thus an opportunity to rethink how we produce and consume. The Anthropocene shows us the cracks forming in the old, monumental institutions we take for granted (McKean 2017), like traditional top-down capitalist structures, and invites consumers to devise their own pathways to circumvent the larger institutions—these consumer-

led strategies[7] can include parallel currencies, cooperatives, self-managed spaces, maker spaces, sharing activity, peer-to-peer marketplaces, and collaborative programming.

Mason's perspective[8] contributes to the discussion of problematizing the roles of producer and consumer. New sharing behaviors that place technology and social change at their core are promoting qualities such as collaboration, openness, and transparency, which have the potential to disrupt traditional supply chains and market economies (Joyner Armstrong and Park 2017; Martin 2016, 149; Barnes and Mattsson 2016). Consumer-led strategies are giving consumers more agency in terms of access to production processes and materials. In other words, a consumer's agency in the top-down fashion system emerges alongside *a posteriori*, or experiential, knowledge of the sites and materials that produce fashion, and access to this knowledge is important to empower consumers who are developing alternative consumption strategies. Belk (2014) identifies that consumers have changed from the traditional capitalist mode of consumption, in that they "are what [they] own," to a postcapitalist perspective in which he says "[they] are what [they] can access" (Belk 2014). In addition to this economic view, an consideration of ontology is necessary to reach the aims of this dissertation.

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[7] These have also been called "collaborative consumption" or "the sharing economy," but in this text, they will be identified as "consumer-led strategies."

[8] Paul Mason is an economist, and while his book offers insight into how consumers are reclaiming agency, a thorough critique of his claims is beyond the scope of this study.

Consumers, by definition, consume. They are situated within an ontological frame—or perhaps "cage" to borrow a term of Sloterdijk (in Kirksey 2015)—in which they do not produce, and only select what is offered from producers. Can a consumer be anything else—a hacker or a maker, for example[9]?

The producer and the consumer are engaged in a hierarchical relationship in which the producer creates products from which the consumer selects, leveraging their purchasing power to express their needs to producers. Within the context of environmental sustainability, they are at odds—how can a consumer take the responsibility for making environmentally ethical choices when they have no agency in the production of consumer products? While there is no way to unequivocally say who holds the responsibility for dealing with the industry's ethical and environmental problems, one thing is certain: The fashion industry, predicated on classic capitalist structures of growth, obsolescence, resource extraction and top-down production, is "old-fashioned" (Edelkoort 2017). In the face of environmental crisis, it needs radical new methods, and Clarke identifies the need for methods that "challenge existing hierarchies of 'designer,' 'producer,' and 'consumer'" (2008, 429).

1.1.2.1 The Dominant Fashion Industry

[9] It is important to state that a consumer is not a victim, and not only a passive actor. De Certeau (1988) posits that a consumer is a creative agent who actively manipulates their environment through everyday actions.

How did this “old-fashioned” industry come to be? Fashion’s anachronistic qualities are perhaps tied to the two longstanding hierarchies outlined in this chapter, but the roots of this current situation start when garments began to be mass-produced in standard sizes.

Mass-produced fashion is a relatively new concept which began to take shape in the middle of the 19th century, with the industrialization of the fabric-making process in England. Since the mid-19th century, when the development of the spinning jenny and the sewing machine allowed clothing to be produced on a large-scale and in centralized factories and workrooms, the production processes of fashion became increasingly opaque to the consumer. In Europe, North America and Japan, these and other technological developments created new employment opportunities and, in the first half of the 20th century, led clothing production to move from the home to the factory. In the period after World War II, purchase decisions in the West shifted from investment dressing and wartime austerity to ready-to-wear novelty, and notions of disposability and an increasing desire for new styles emerged (Palmer 2007). The youth cultures that appeared in the 1960s created a sudden demand for cheap clothing that, once coupled with globalization in the 1980s and ’90s, further encouraged production to move to countries with developing economies (Ruppert-Stroescu 2009) following the capitalist logic of profit maximization.

The result of mass-producing fashion was a dramatic lowering of garment prices as consumers were faced with prioritizing cost and accessibility over quality, production origins and materials. The decreasing costs of fashion, to consumers, comes at the expense of the people and landscapes that provide the raw materials for garments (Caniato et al. 2012). Mass production has been strongly criticized for its negative social and environmental impacts in terms of low worker safety and compensation, unsustainable resource extraction, the use of non-biodegradable manmade materials, pollution, and the production of waste. Ethically dubious practices and cost-cutting became the norm, particularly with the fast fashion[10] companies of the early 21st century, including Zara, H&M, Primark and Forever 21. These companies have been criticized for humanitarian and environmental infractions, including producing a surplus of products and allowing workers to be exploited in overseas factories (Bain 2015). Despite these criticisms, fast fashion companies remain dominant in the market (Caniato et al. 2012, 659; Clarke 2008, 428). Lead times for fashion production have shortened and the quantity of garments produced and consumed globally has increased, which has left a significant environmental footprint. Pan et al.'s (2015) study suggests that the word "fashion" itself has come to be associated with unsustainable scales of consumption, and the desire for newness. Yet concerns about fashion (in apparel especially) are not new:

[10] These companies are called "fast" fashion because they produce quickly and in high volume. They can also be considered "fast," because their garments wear out so quickly.

"Much of the concerns about overproduction, low-quality products, fast fashion, and planned obsolescence that we hear today were already voiced loudly in the 1950s and 1960s" (van Helvert 2016, 18).

However, if fashion is a cycle of renewal predicated on engineered obsolescence and volume, it is also potentially an engine for innovation. Perhaps this engine can produce the right conditions for a renewal that is environmentally and ethically sound.

Changes were made to production methods in the 1990s in response to pressure from consumer activists and researchers who were critical of the environmental burden and waste associated with the fashion industry. However, the hierarchy between producer and consumer endured, and the steps toward environmental sustainability were not enough. As Fletcher (2016) points out, these strides taken by garment producers to maintain ecologically sound material flows have been overshadowed by the rapid rise of consumerism: even if each garment is less environmentally damaging, the sheer volume of garments produced, consumed and disposed of trumps any positive gain. Sustainable fashion researchers agree that fundamental changes in the industry will happen only after the problem is addressed at the systemic level (Niinamäki and Hassi, 2011; Fletcher, 2010), while considering a new "ecological and participatory paradigm of thought and practice" for fashion design (Fletcher and Williams, 2013). "Participatory" is a key word, and to really

consider the implications of this requires an reappraisal of the divide between producer and consumer—a split that is bound up with ontology, ideology and technology.

1.1.2.2 Distance

Techniques for destabilizing the primacy of the producer have been nascent for decades in the form of criticisms of the unintended environmental and social consequences of industrialized or postwar consumer society (McLuhan 1964)—one of these consequences is a separation, a distancing, between consumers and the products they consume. Nearness and farness are emergent ideas in this era, not just in relation to products but also to communication and mobilities. Reflecting on the telephone, Martin Heidegger (1971) laments the contradictory nature of technology: "What is nearness if it fails to come about despite the reduction of the longest distances to the shortest intervals?" While the phone allows for communication over great distances, the "nearness" gained from face-to-face human interaction is lost in transit. Heidegger anticipated the way we interact with mass-produced consumer products, especially those products of the dominant fashion industry: While the products of this industry have become easier to access, the materials and sites of production remain distant and obfuscated to consumers. A realignment of the producer-consumer hierarchy would allow consumers access not only to the means of

production, but also other qualities, such as knowledge of soil, endemic plants, and unique climates and geographies.

Technology closes vast geographical distances, but keeps things remote. In fashion, too, remoteness has become a fundamental aspect of production and consumption: designs are sent to offshore factories and can be sold online to consumers, who may be thousands of kilometers from the site of production. The inner workings of the fashion industry—the sites and processes that animate fashion products—are inside a "black box," a system with only inputs and outputs, whose operations are unknowable or deeply hidden. Most consumers don't know how and under what social conditions fashion products are made (Siegle 2011). Due to the vertical disintegration of the supply chain, some designers themselves never see the inner workings of fashion's black box, as designing and manufacturing can take place in separate locations or distributed among many locations. Consumer products made in this way may have impenetrable exteriors that render the inner workings inaccessible.

Consumers have little agency over or knowledge of how garments are produced in the dominant fashion industry. They engage with the outputs of the black box: garments, which are treated as impenetrable, discrete objects, untethered to their Earthly origins. According to Anusas and Ingold (2013, 58), modern, mass-produced products, as "lines or conduits of energetic and material circulation are

wrapped up within opaque, enclosing surfaces that conspire to hide these circulations from perception and present the appearance of discrete, finished entities." This, the authors claim, is the fundamental paradigm of the Western design practices: to diminish "the depth and scope of our material involvement with the world around us" (Anusas and Ingold 2012, 58). Van Helvert (2016, 111) echoes this idea by suggesting that the "conventional design of electronic devices has become surface design, which is characterized by impenetrable polished exteriors behind which the mechanisms and electronics are stored away."

If we look at fashion products with Anusas and Ingold (2012) and van Helvert (2016), it is evident that the sites and materials that animate garments are not materially evident. Consumers do not see the fashion industry's sites of production and materials and can therefore be intentionally misinformed by a producer about how a fashion product is created. This may not be intentional obfuscation on the part of the producer, and it may not be willful ignorance on the part of the consumer, as it is difficult to discern and disseminate the conditions of production in complicated supply chains.

The variety of terms that denote sustainability in fashion and the unstandardized formats in which these terms are presented poses a problem for consumers wishing to purchase less damaging garments. Peirson-Smith and Evans's (2017, 7) recent study of 100 consumers in Hong Kong, for example, shows that some

had difficulty defining the term "sustainability" correctly—only "23.7% of respondents were able to match the right definition..." Even if a consumer wanted to ask for more explanation or transparency in production, by asking where fashion products come from and how they are made, these questions are not easily answered as complicated production logistics can be difficult or impossible to trace (Braungart and McDonough 2002) and factories where garments are assembled are difficult to access. However, the raw materials required to produce textiles are perhaps even harder to determine. A garment label may indicate care instructions, country of assembly and fiber used yet there is no regulation in the European Union, Australia, or Canada for example, requiring that the origin of the material or fiber be shown (European Parliament 2011; Australian Government 2010; Government of Canada 2000). In Japan, the name and contact information of a brand or designer is required on a garment's label, but not the producer of the textile materials or site of assembly (Japanese Government 2010).

How can a consumer take responsibility for ethical consumption, while having little agency over or knowledge of how garments are produced in the global top-down fashion system? Inside fashion's black box remain the kinds of "material involvement" that Anusas and Ingold are referring to, involvements which remain obscure to the consumer.

Fashion products, made from unseen materials and through unknown processes, are what Relph (1976, 79) would call "placeless," meaning they are not tethered to any specific place or carry a sense of the landscape from which they emerged. They are conceived, produced, shipped, and ultimately fulfill their limited lifetime before being thrown away or recycled—they are constantly suspended, untethered to any specific place. Moreover, the "Critical Regionalism" conceptual framework developed by architectural theorist Kenneth Frampton (1983) is a related means of understanding how the processing of raw materials into textiles in fashion follows a set of standardized, universal criteria that erases any local idiosyncrasy or differentiation. This phenomenon will be further discussed in Chapter 4, using paper clothing in Japan as a tool for examining how placelessness and critical regionalism are relevant to fashion in the early 21st century.

1.1.2.3 Technology[11]

The role of technology in the entrenched split between producer and consumer in fashion can be traced to the Industrial Revolution, with the development of knitting and weaving machines. The divisive tendency of technology is changing in some ways now, and digital technology is allowing for the distance between producers and consumers to be shortened. Additionally, emerging technologies—3d printers,

[11] For a more thorough examination of the role that technology and innovation has played in the development of fashion in global cultures throughout history, please see Tortora (2015) and Tortora and Marcketti (2015).

dying facilities, weaving and knitting machines—are disrupting the ontological position of consumers by giving access to tools and transforming them into makers/producers of various kinds.

In response to the ethical uncertainty involved in consumption, consumers are finding their own pathways to produce and consume products by engaging with real and online communities, as well as utilizing powerful tools for making materials and products. The role of technology in mediating between consumers and garments only increased in recent decades. This has led to isolated shifts in the producer-consumer hierarchy. Challenging this hierarchy, or perhaps, simply enabled by the logic of network society, consumers have emerged as producers with the wider cultural turn toward making, evident in several sectors that involve design. Consumers are embracing information technology, and developing new ways to consume and produce fashion in small-scale and niche communities of maker-consumers. Some of these maker-consumer proposals directly address placeness and local idiosyncrasy by embracing local geographies and community-based production. These makers are proposing new ways of producing that are the result of relationships—between people, their communities, and the natural environment—these makers will be discussed in chapter 3 and 4.

In opposition to the dominant system of production, these maker-consumer proposals in recent years favor material and semiotic links to the local landscape and

community-based production. This movement has been labeled by some as the "Third Industrial Revolution" (Rifkin 2011), "The Fourth Industrial Revolution" (Schwab, 2016), "maker culture" (Anderson 2012), or "collaborative consumption" (Slee 2017; Botsman and Rogers 2010). New value systems are being explored through making by considering consumer products made beyond the typical scope of consumption (Fletcher 2016; von Hippel 2016). By innovating new methods, can consumers problematize their ontological position in relation to producers, and tether their *own* products to local communities and landscapes?

1.1.2.4 Top-Down and Bottom-up Phenomena in Fashion

The current problematizing of the consumer-producer hierarchy supposedly led by the emergence of maker-consumers can be understood via a discussion of a much older phenomenon. Fashion is information; we use it to read and be read by one another in society, to situate ourselves in various social hierarchies. Sociologist Georg Simmel, writing at the turn of the 20th century, a time when social distinctions may have been easier to spot through dress, identified the rigid, top-down and class-based nature of fashion. When new styles were adopted by the upper classes and aristocracy, they would "gradually diffuse to the middle and then working classes" ([1904] 1957 in Crane 1999, 14). Crane (1999) found that the ways that fashion diffuses have been undergoing a destabilization phenomenon since the late 1960s. Since this time, the top-down system of fashion production began to reverse as

consumers asserted themselves through their purchasing power. One of the focal paradoxes of the fashion industry began to emerge: brands manipulate *and* answer the desires of consumers simultaneously. Producers began to listen to the needs of consumers, and changed product lines in response to a branching of consumer tastes, which resulted in more options and, eventually, an oversaturated market (Ruppert-Stroescu 2009, 22). This changed in lockstep with mass industrialization, and according to Crane (1999, 23), fashion trends in the dominant system in the 1990s were typically set by "fashion forecasters, fashion editors, and department store buyers." However, as early as the 1970s, it was identified that the diffusion of fashion through a culture could be bottom-up, in a process labelled "the status float phenomenon" (Field 1970), in which the influencers changed from elites to industry experts—the flow of innovation and influence moves upwards from lower status individuals. Fashion is transmitted from both the top and bottom now, categories that are even more confused with the shifting status of a new generation of power brokers and trend forecasters that includes bloggers, sudden celebrities, and industry outsiders who catch the eye of street fashion photographers. Despite the destabilization occurring through the diffusion of popular modes of dressing and fashion trends, the consumer still has little-to-no access to the sites or materials of production. However, only recently have producers begun to invite consumers to participate in the production of garments, in a process called co-design (Sanders and

Stappers 2008). If the top-down trend relationship can be destabilized—to become bottom-up, horizontal, or recursive—then why can't the production of fashion be as well?

1.1.2.5 Makers

Meanwhile, maker-consumers[12]—called "hackers" (von Busch 2012), "makers" (Anderson 2012) or "free innovators" (von Hippel 2016)—who have become wary of top-down industrial capitalism have responded by leading the innovation of alternative and collaborative consumption pathways. These maker-consumers engage with new methods based on a do-it-yourself or utilitarian need—"I can just make or fix it myself," for example—or based on an ethical impetus—"I would rather support a small-scale and local industry, and know where things come from," for example. Chapter 3 will explore this phenomenon further by examining three core qualities of maker-consumers—collaboration, openness, and transparency—which could inform new ways of making fashion.

The problematization of damaging hierarchies is aided by the reshaping of modern communities, as social awareness opens new possibilities for activism and new paradigms for design. Social design projects and strategies[13] have been called by

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[12] A maker-consumer, or consumer-producer has also been called a "prosumer" by Alvin Toffler in his 1980 book *The Third* Wave, and was forecast by McLuhan and Nevitt to appear as a result of advanced network culture in their 1972 book *Take Today*.

[13] The use of the word "strategies" in this dissertation is not to be confused with de Certeau's (1984) usage of the word to denote top-down institutional power relations, in which an attempt is made to prescribe specific behavior and action. Rather, the usage of "strategy" in this study may be closer to

various names, such as "crowdsourced design," "co-design," "collaborative design" (and "collaborative consumption," which will be discussed in Chapter 3), and "open-source design," (von Busch 2012).

However, Martin (2016) shows that some new forms of sharing and collaboration, like those of Airbnb and Uber, for example, could potentially lead to exploitation in the form of unpaid labor and could commercialize aspects of life previously out of reach of capitalism (Morozov 2013 in Martin 2016, 149). Further, considerations of the effects of collaborative consumption need to be considered from the perspective of environmental sustainability (Joyner Armstrong and Park 2017). Technology has allowed communities to expand beyond geographic limitations and grow from local neighborly networks to diverse places, shapes and scales. Now, communities—or holons, to borrow from Koestler—can be formed online from inside homes, and businesses are being created to bring people out into the community to form networks both online and in real life. These communities problematize the roles of producer and consumer, and could enable new ways to make and consume fashion that shifts the focus of a product from its utilitarian qualities to how, by whom, and in what landscape it was made. Climate change and the Anthropocene are offering fashion designers the chance to reframe their methods through technological and social considerations.

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de Certeau's notion of a "tactic," which he says are developed by ordinary people to negotiate, maneuver or circumvent top-down strategies to fulfill their own aims and desires.

1.1.3 Human Over Nature: Making in the Anthropocene

1.1.3.1 Human Primacy

The second fundamental hierarchy of the fashion industry that will be discussed in this chapter is the human primacy over nature. Over the past two decades, fashion insiders and researchers have become increasingly aware of the scale of environmental problems, and have taken steps toward addressing them. Understanding this problem requires an understanding not only of how we produce—quantity and qualities of garments—but also the implicit ideologies and perspectives that explain *why* we make things the way we do.

Even after the Copernican Revolution, which challenged Earth's central position in the universe, human beings continued to occupy a central position of dominance in the global ecology, and this positioning is reflected in the fashion industry, too, particularly in the way that resources and materials are used in a paradigm of extraction and processing. Following Stengers (2010, 34), "[i]f there is one thing that political ecology has learned from scientific ecology, it is that we should abandon the temptation to conceive of nature as submissive, manipulable, assimilable to some 'raw material' on which we would be free to impose whatever organization we choose." In the case of fashion, can the producers of fashion accept the news of the environmental crisis, and fundamentally change the way they make materials and form? The Anthropocene calls for a dramatic restructuring of the

entrenched methods of industrialization, and one of these methods is resource extraction and processing. In light of recent research concerning anthropogenic climate change, human dominance is destabilized, allowing for alternative relationships between human and nonhuman organisms, from plants and animals to bacteria and fungi. Can methods for making materials and form for fashion be developed that engage with what Stengers (2010, 33) calls "nonhuman living beings"?

In the West, nature has long been a distant place—distant from the human world and used as motif and source for material. The ontological distinctions between humans and nonhuman organisms place the human in a unique position of dominance but also richness, with the power to create. Heidegger (1995, 177) claims that "[t]he stone is worldless; the animal is poor in world; man is world-forming." Berger (1984) posits that the hierarchical relationship between man and nature began to take shape as far back as the Agrarian Revolution, when humans began planting monocultures. This became further entrenched in the 18th and 19th centuries with the Industrial Revolution increasing urbanization, as animals and plants began to disappear from humankind's immediate field of vision. Mirzoeff (2014) argues that modern society has relegated the natural world to the outer fringes of the human experience of life, and that art has become a means of understanding our relationship to it. Berger (1980) echoes this when he illustrates that humankind suffers spiritually

due to our dualistic view of the world, and as animals and plants moved (or were removed) from urban centers and the human field of vision, their representations further became adornments for textiles, housewares, and toys for children.

This view of nature as a wild place, distanced from civilized society is challenged by non-Western and indigenous practices. In North America, for example, Anderson's (2005) ethnographic research with native Americans in California shows that a reciprocal relationship with a landscape can be beneficial for human and nonhuman organisms. This relationship is predicated on a "kincentric view of nature" (Anderson 2005, 57), meaning that humans are not positioned at the top of a hierarchical structure, but are part of the movements and flows of material and energy in nature, and hold nonhuman organisms as kin or family—in this view of the world, says Anderson (2005, 57), the "plants, the animals, the rocks, and the water ... are people." California's Yosemite Valley is one site where the older roots of the Anthropocene can be seen, where the landscape and its human inhabitants have shaped one another through long and slow exchanges. Once thought by anthropologists to be the pinnacle of pristine wilderness, Anderson argues that this landscape is a cultivated and tended environment, the result of hundreds of generations of people acting as "user, protector, and steward of the natural world" (2005, xvi). The author's central thesis in her text *Tending the Wild*, is that "indigenous people's stewardship of the land carries important lessons for us in the

modern world" (2005, xv). The sustainable relationship built between the people and the plants and animals in a landscape—what Anderson (2005, 2) names the "tempered use of nature"—renders all actors interdependent. The plants and animals may come to depend on human stewardship to thrive, and a return to local stewardship—rather than what Anderson (2005, xvii) calls "hands-off preservation"—may be necessary. These lessons can be seen in many cultures around the world, including Japan, and can offer lessons not only in management of natural resources, as Anderson focuses her attention, but also in how to build communities of craftspeople who cultivate plants and animals to produce specific fibers, strengths, behavior or colors. Anderson explains this phenomenon:

> I found that some of the judicious harvesting and horticultural practices of California indigenous cultures were remarkably similar to those of native peoples in South America, Australia, and Africa. I was intrigued that parallel resource use and management systems had developed independently on different continents. For example, Australian Aborigines and California Indians both used cattail (*Typha Spp.*) for cordage and other purposes, burning off tule marshes to recycle dead material and spur new growth. Ancient peoples in Egypt cultivated flax (*Linum Usitatissimum*) to encourage it to produce long, straight stems with longer bast fibers good for cordage and textiles, much like the first Californians tended patches of dogbane (*Apocynum Cannabinum*) so that its stems would produce fibers suitable for weaving belts, tumplines, feather capes, skirts, and many other items. (Anderson 2005, xv11)

In Japan, a similar phenomenon of interdependent land stewardship and reciprocal shaping exists—it will be discussed further in Chapter 4—named *satoyama*.

Can such sophisticated relationships between people and their landscapes be considered acts of design? Similarly, how can they contribute to new methods for fashion design that emerge from relationships with communities of makers and their landscape?

1.1.3.2 Gaia

Visionary designer and architect Buckminster Fuller (1895-1983) produced a body of work that promoted environmental awareness through technology and design. He developed a concept he called "Spaceship Earth"—a view of the Earth as a mechanical self-healing system with human beings at the helm, steering it around the sun. Fuller's was a techno-utopian vision of the future, and he held human beings in a position of dominance over Earth's systems.

Rather than a relationship in which the human is the captain of the ship on which resources abound infinitely, environmentalist, scientist and futurist Lovelock (2006) diverges from Fuller by arguing that humans are only small units situated within a larger global ecology, a self-regulating, planet-sized organism called "Gaia." Koestler's concept of holarchic systems helps to frame the conceptualization of Gaia, and the relationships between human and nonhuman organisms. Haraway describes Gaia as such:

> In this hypothesis, Gaia is autopoietic—self-forming, boundary maintaining, contingent, dynamic, and stable under some conditions but not others. Gaia is not reducible to the sum of its parts, but achieves finite systemic coherence in the face of perturbations within parameters that are themselves responsive to dynamic systemic processes. Gaia does not and could not care about human or other biological beings' intentions or desires or needs, but Gaia puts into question our very existence, we who have provoked its brutal mutation that threatens both human and nonhuman livable presents and futures. Gaia is not about a list of questions waiting for rational policies; Gaia is an intrusive event that undoes thinking as usual. (2016, n.p.)

Following this logic of the human being embedded in a larger system of contingencies, Morton sees reality and all the things in the world as part of a "mesh" and argues against the use of the word "nature" at all, saying that it blocks people from experiencing "ecological forms of culture, philosophy, politics, and art" (Morton, 2007). If the hypotheses referred to above are correct, then we and all things in the world are only small parts of a larger entity and are therefore part of one another in a continuous exchange of matter—infinitely contingent on one another in a messy, tangled web of inter-relations between human and nonhuman organisms; all things are connected and affect one another in an infinite, imperceptible display of slowly fitting together.

1.1.3.3 Anthropocene

The larger encompassing idea behind this current study is the notion of anthropogenic climate change. The acidification of oceans, loss of species, desertification of farmland and the gradual increase in planetary temperature could have been activated by human activity, beginning as far back as the Agrarian Revolution 10,000 years ago, and "accelerated" during the 1950s (Steffen et al. 2015). It is argued that the cultivation of monocultures, domestication of animals, the burning of fossil fuels, and the increase in human population have likely instigated a chain of events that has permanently affected Earth's atmosphere (the gaseous layer surrounding the planet), biosphere (the layer of the planet where living things are)

and even lithosphere (the crust and the mantle of the Earth) (Mirzoeff 2014, 213; Crutzen 2002; Crutzen and Stoermer 2000).

The Anthropocene is not only a geological age, but a tool for sustainable fashion designers and researchers to ask questions about the relationship fashion has with its raw materials and global systems of production. Much research has recently been published concerning the ability of human action to affect change in the "mesh" (Morton 2007) that connect humans to nonhuman organisms. The knowledge that human beings have catalyzed a change in the environment—a "brutal mutation," according to Haraway (2016)—coupled with numerous advances in biology, biotechnology and genetics, allows us to redefine nature and our position within it. This necessitates a shift from human exceptionalism to an embedded view of the humans in the world. Fashion industry leaders, researchers, and designers need to consider the role that the consumption of fashion plays in the environmental crisis. However, this study will not focus on industry leaders or researchers so much as designers and consumers, and will suggest that they may embrace this destabilization of the primacy of humans by addressing the agency of the nonhuman in the design practice.

The Anthropocene invites a restructuring of the human and nonhuman relationship because it challenges our preconceived notions of the finiteness of the Earth, and our place within it. According to Rickards (2017), the Anthropocene

"stretches and challenges concepts." This geological epoch can be used as a critical tool in fashion, because it gives fashion designers the opportunity to reframe their relationship with natural materials, and develop new methods which shift from extraction and processing to nurturing and formation. Rickards (2017) continues by saying that there is no empirical distinction between the human world and the environment, and the lack of an ontological boundary is something that art and design can begin to question. To Rickards (2017), echoing Barad (2007), the garments we wear are embodied energy at multiple scales. What "lines or conduits of energetic and material circulation" (Anusas and Ingold 2012, 58) are bound up in a piece of clothing? Where does the life of a garment begin and end, and where can its "lines" be traced to?

If we accept that anthropogenic climate change and other human actions have affected the planet on a micro (molecular) and macro (global) scale, then the longstanding boundary which exists in Western culture between humans and nature can be problematized. When the world—geologically—has been altered by humans, what is natural and what is human-made? Boundaries become blurry when the scale of the change is absorbed. In this space, where humans sink into the background of nature, new practices can emerge. One of these, of relevance to this study and to fashion, is interspecies collaborative design, which will be further explored in chapter 4. This idea is an extension of Haraway's (2007) notion of "making kin" with

nonhuman organisms, and Næss's (1979) "relational or total-field image," which takes a monist (man and nature as one) rather than dualistic (man and nature as separate) view of the world. By collaborating with nonhumans, designers would be employing the notion of "reciprocal capture" identified by Stengers (2010, 35-36). Such a practice would enable further questioning regarding the distinctions between the natural and the human-made, in relation to the materials and practices of fashion.

According to Haraway (2015), the Anthropocene has "obtained purchase in popular and scientific discourse in the context of a ubiquitous urgent efforts to find ways of talking about, theorizing, modeling, and managing a Big Thing called Globalization." She is a vocal critic of the use of "Anthropo-" in "Anthropocene," arguing that this proposed age is rather defined by myriad definitions and definition-making. And because "human exceptionalism and bounded individualism" have become "unthinkable" in the natural or social sciences, we should name this period after the real forces that have shaped our present: the "Capitalocene[14]," for example, or the "Cthulucene," which has the same prefix as the nightmare creature appearing in the writing of H.P. Lovecraft to denote the anxieties invoked by a world where everything is at stake. Yong (2016, 8) sees the human as a conglomerate being, a vehicle for many others, and opts for the title "Microbiocene," which he calls "a period that started at the dawn of life itself and will continue to its very end." Yong

[14] See also Moore (2017).

(2016, 7) is using this term to express that all human bodies are shared with thriving communities of organisms, and takes the position that human beings only occupy a small part of the history of life on the planet.

1.1.3.4 Technology

Technology—the microscope, for example—has made us aware that our bodies are not discrete entities. A previously invisible world has been made visible: How "human" are we, if our bodies are vehicles for communities of nonhuman organisms, on which we depend for many basic bodily functions?

As Mirzoeff (2014, 215) points out, the visualization of the Anthropocene through technology undoes other "transcendent" hierarchies and classical narratives: "Nature, so often used by humans to define perversity as unnatural, has itself become perverse." Perversity is a hubristic human perspective stemming from human subjectivity—nature isn't any *thing*, it just is. The shifting of hierarchies that takes place in the Anthropocene does not require human beings to surrender their dominance over nature and become subordinate to the nonhuman entities in the world. Rather, it invites a shift to Koestler's (1967) holarchical view of the world—a perspective in which agency is distributed among the subcomponents of a larger system.

The parts—holons—entangled in the Anthropocene may be microscopic or cosmic. Our effect on the world is both legible in tiny particles of plastic ingested by

plankton, and in trash orbiting the planet or left on the Moon and Mars. But the world is also legible in us—the "human" shrinks when we acknowledge how tangled we are with nature, with bacteria and microbes, with animals and with weather and geography.

The Anthropocene and its effects on humanity and the planet are on such a scale that all epochs are subsumed within it. Mirzoeff (2014) agrees with Chakrabarty (2009), in that while the degrees of impact vary geographically, the Anthropocene affects every place on Earth. It is this sense of scale that makes this proposed period such a difficult subject to understand. Mirzoeff (2014) indicates that due to the immensity of this phenomenon, humans are not able to perceive it directly, but can only visualize it through data mediated by climate models (see Edwards 2010). Such abstractions can be dangerous. Mirzoeff argues that the large scale of anthropogenic climate change causes an inability to see it and that it:

> ...allows us to move on, to see nothing and keep circulating commodities, despite the destruction of the biosphere. We do so less out of venal convenience, as some might suggest, than out of a modernist conviction that "the authorities" will restore everything to order in the end. What is ultimately far more disturbing to modern thought is the potential realization that no one (or nothing) in fact has authority—the market and the state, twin avatars of modern progress, can only combine to advance the progress of the Anthropocene. (2014, 217)

The environmentally unsustainable fashion industry—unable to balance resource extraction with natural replenishment—suffers from the problems Mirzoeff identifies. Consumers, and even producers, who wish to lessen their negative impact

on their environment are handicapped by their inability to visualize the impact they have on either the planet or the fashion industry. If consumers first interact with the products of fashion only when they buy, how are they to imagine the lines of energy and matter that link a garment to its various sources, and thus visualize its wider ecological impact? This is an important consideration for sustainability studies and for future fashion design proposals, considering that one of the axiomatic criticisms of the contemporary fashion industry is its impact on the natural environment in terms of extractivist resource use, and industrial and post-consumer waste (Fashionrevolution 2016; Niinimäki 2013; Black 2012; Fletcher 2010).

The Anthropocene gives us the chance to visualize the lines of energy in a garment. It gives form to a hard-to-visualize force of change and opens pathways of investigation to reframe the human-nature hierarchy. The Anthropocene shows us that abundance and danger can exist simultaneously: Abundance, in most developed countries, is embodied through a high quality of life or technological progress (AI, digital technologies and biotechnology). But we are more aware than ever that overproduction and overextraction, in the pursuit of progress, can lead to ecological collapse. The destabilization of classical political and environmental hierarchies is both crisis and opportunity. Following Mason (2015, 16), we must find new ways of living to replace the old capitalist systems that have reached the limits of their adaptability.

Technologically-mediated forms of living with nature may be able to contribute to sustainable ways of making materials. Heidegger (1977, 4-5) gives the following broad definition of technology: "The manufacture and utilization of equipment, tools, and machines, the manufactured and used things themselves, and the needs and ends they serve, all belong to what technology is. The whole complex of these contrivances is technology. Technology itself is a contrivance[…]." This conception of technology can be called an instrumental and anthropological definition. For humankind, the natural world has been an instrument for the progress of human culture, and we have treated it almost as though it were another human technology—to be used.

Philosopher Humberto Maturana (1997) resists the notion that "evolution is changing its nature so that technology is becoming the guiding force in the flow of the cosmic change in relation to us." In other words, he is against the notion that progress is the ultimate value of humankind or that human beings have instigated a shift in human evolution through the tens of thousands of years of technologically-mediated relationships with our natural surroundings. A purely technical remedy to the problem of anthropogenic climate change is not enough, any solution requires a consideration of the social and technological.

What shape will progress take in the future—how will human relationships with nature be mediated by technology? Alexis Shotwell (2016), in her book *Against*

Purity, argues that there is no pure state to which we can return—we can only move forward within the changed anthropogenic landscape.

1.1.3.5 Fashion and the Anthropocene

While there is no overarching, agreed-upon global narrative for understanding climate change (Schwab 2016; Mirzoeff 2014), multiple metaphors surround the collective phenomena of the Anthropocene and are important to fashion design. One such narrative is that we have reached the "peak" of nonrenewable resource extraction—similar to oil in the 1970s (Rifkin 2011) or minerals in Australia (Prior et al. 2007). Prior et al. (2007, 4) point out that there is a debate about accuracy of the timeline and effects of "Peak Oil," but make the argument that the "peak" debate is best understood as a metaphor and a driver for change as it "raises the specter of resource depletion":

> The use of the peak metaphor for resource management is useful for several reasons. In addition to representing an approximate model for predicting annual production, it introduces a focus on the services provided by the resource—in this case the energy services provided by oil—and highlights the need to provide such services by different means post-peak to avoid disruptions to the economy. (2007, 18)

The authors suggest that the metaphor of a peak—reached through unsustainable extraction—can act as a driver for change.

The relationship between the manmade and natural worlds is changing and with this change, new methods of producing materials and form have emerged that

are the product of embedded relationships with nonhuman collaborators. Can we develop a practice of making that surrenders more of the process—even design—to nonhuman organisms? The answer to this question may involve developing practice of "making" through nurturing and growing, which would require a move away from the conventional system of extracting resources and processing them into forms and materials. Growth in this sense does not only denote biological function, but a process of emerging and coming into form. Consideration of Hallam and Ingold's (2016, xiii) declaration that "there has been an overwhelming bias towards artefacts over organisms, or towards things that have been made rather than things that grow...[we need to] focus less on the 'objectness' of things and more on the flows of materials by which they come into being and carry on," allows for a perspective on fashion items that shows them not as discrete objects, but paused moments of material and energy flow—in a constant state of becoming and being shaped.

When does the shaping of a paper shirt, for example, begin? The shaping happens long before the patternmaker or designer decides how to cut the cloth and style it. The shaping begins in the trees that produce the fibers for the shirt. Just as the potter's clay comes from sediments shaped eons ago, the paper shirt-maker's paper is shaped by processes just as old, and just as embedded in a landscape as clay (weather, climate, groundwater, and human care). The maker takes a position as nurturer of the material—coaxing it out of its original location—in a negotiational,

sympoietic process of nurture and exchange. The negotiation in the process occurs when the maker affects the material, as Ingold and Hallam (2016, 4) suggest: "the maker effects an ontological transformation in the material, not through the application of exterior force to inert substance, but through intervening in a play of forces and relations both internal and external to the things under production." This multiscale process of nurture and negotiation is at the core of multiple projects that traverse the boundary between human and nonhuman agency, and encourage the emergence of form and material to produce art and design[15]. While Ingold and Hallam (2016, 5) ask that this in-between kind of production, "making-in-growing, or growing-in-making," be called a new name—they tentatively offer "Anthro-ontogenetic"—the terms Biodesign and -art are currently widely used.

1.1.3.6 Biodesign and Bioart

Changes in climate at the global scale suggest a contingent relationship in which humans are part of a larger system. But in the context of art and design collaborations, a collaboration between humans and nonhuman species may not be entirely nonhierarchical[16].

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[15] it is important to note here that the goal of many of these art and design projects is not wholly utilitarian or technical. Instead, they adopt an approach of critical exploration and expression.

[16] I acknowledge that a human perspective presupposes a hierarchical position, and that a completely nonhierarchical position between humans and nonhuman organisms may be impossible. A more complete critique of the ontological and epistemological implications of this concept is outside the purview of this dissertation.

The concepts outlined above about making and growing, as well as wider ideas of environmental contingency and hierarchical engagement are being explored by designers and artists under the monikers "Bioart" and "Biodesign." Environmental contingency in this case denotes a nonhierarchical relationship with nonhuman organisms, although this is a difficult position to take for humans who are in effect setting the parameters of a relationship with nonhuman organisms. Any nonhierarchical relationship is still governed by the human in the relationship, because the willingness of the nonhuman partner cannot be ascertained. This is true in the vast number of interspecies relationships that are happening around us all the time—our bodies as hosts to other organisms, or pets who live in our home, and the plants and animals that provide the raw materials for our clothing. We do not live every day with a constant awareness of the deeply contingent relationships with the nonhumans that animate our world and bioart and biodesign can be conceived as tools that allow us to see and question these relationships, and even to build new ones.

Bio- is a prefix which has recently been used to denote works of art and design which are made with living nonhuman organisms. Other neologisms used to describe specific practices within this growing field include: biomimicry (Benyus 1997), material ecology (Oxman 2014), biocouture (S. Lee 2011), biofacture (Collet 2015), and synthetic aesthetics (Ginsberg et al. 2014). Works created in these intersecting fields are the result of reframed relationships between human and nonhumans—they

ask questions about the meaning and creative potential of collaborative relationships with other species. This relationship can be hierarchical, involving dominance and subjugation, or non-hierarchical, built from an enmeshing of human and nonhuman actors. Such bio- works hold a mirror to society and reveal how humankind sees itself in the natural world.

Although the trendiness of the "bio" prefix makes interspecies collaboration seem novel, the notion of working with nonhuman organisms to make products and art has a long history. If we reframe traditional weaving, for example, we see the fabric is the product of the relationship between the weaver and the endemic flora and fauna in a landscape. For millennia, humans have been employing methods of *proto*-biodesign to negotiate form and materials for consumption, such as animal husbandry and the selective breeding of plants. These practices have supported the livelihood of humans, and are evidence of the connectedness and embeddedness of humans in their landscapes. The use of plants, animals, insects, and bacteria to sustain life is a fundamental human activity in food production, craft practices, and other areas.

The fashion industry is contingent on the nonhuman, too. The raw materials, items, and waste associated with fashion production and consumption can be instrumental in planetary life in more ways than semiotic distinction or communication. If made using collaborative methods that include nonhuman partners,

a position counter to the dominant paradigm of extractive, laissez-faire consumption, these objects can link makers materially to their environment and to one another.

In this context, paper can be seen as a form of proto-biodesign because it is the product of a relationship between people and nonhuman organisms found in the landscape that is shaped in a reciprocal manner—the humans tend to the crops, and the crop provides materials that shapes the ways of living of the people, as well as shaping the final product.

In the previous sections, two of the fundamental hierarchies that the dominant fashion industry is contingent upon—the primacy of producer over consumer, and dominance of humans over nature—were discussed to develop the foundational conceptual framework for a method for fashion design in which material and form emerge from communities of humans and nonhumans.

With increasing awareness about anthropogenic climate change and a growing human population, the fashion industry is presented with an opportunity to reassess how it engages with nature and consumers. This dissertation brings together these two hierarchical problems and explores how can consumers can make fashion within their communities—both human and nonhuman—and local landscapes. To explore these concepts, the community-based production structures and material flows present in handmade Japanese papermaking will be examined.

1.2 Japanese Paper as a Conceptual Tool

This section outlines how Japanese paper—*washi*—will be used as a tool for understanding the concepts in this dissertation. A more detailed history of washi and its uses can be found in chapter 3.

Japan offers a unique site for thinking through the problems of humans, nature, producer and consumer and the role that making, design and technology play in disturbing hierarchies. In this dissertation, papermaking is used as a tool to test the concepts—collectivism, interspecies collaboration, openness, and transparency—that emerge from the literature review and fieldwork and to anchor the conceptual questions of this study to extant, community-based practices. By doing so, papermaking serves as a stepping stone in making the connection between longstanding ways of growing natural materials, and emergent methods for sustainable fashion design. In other words, papermaking is used as a tool that invites a recursive understanding of the core research questions—recursive in the sense that the theoretical framework of the dissertation will help to reframe the handmade papermaking practice as proto-biodesign, and that the examination of papermaking as a case study will elucidate the research questions. In other words, through reframing an extant and longstanding practice like papermaking using contemporary qualities such as interspecies collaboration, openness, and

transparency, this study helps to understand and potentially shape nascent design practices that seek to bridge the social and technological[17].

Washi, the result of a relationship between people and their immediate landscape, is a traditional folk craft, and its use is rapidly disappearing. Why select a dwindling folk craft as a model that is meaningful for the fashion industry in the early 21st century? Paper is not only bucolic, pastoral, dated and an anachronism. This study shows how the production of this material offers a framework for thinking through hierarchies destabilized by the Anthropocene.

The main reason that Japan and its washi-making culture were selected for this study was that this kind of research—connecting qualities from sustainable fashion and interspecies collaboration to traditional material-making methods in order to contribute to the development of new theory—had not been done before. There is a rich history and breadth of traditional craft practices in Japan that are based on close relationships with the natural landscape, but the precise connections that this study makes have not yet been made.

Instead of other materials—like silk, leather, and linen which are also made with nonhuman partners—washi and its attendant culture was selected as tool for thinking with for four main reasons. First, paper acts as an example of a proto-biodesign material, in the sense that it is the product of a proportional (small in scale)

[17] It is important to state that this dissertation is not explicitly promoting the notion that handmade Japanese papermaking in its current form is an infallible solution to the complex problems outlined in this chapter.

and negotiational (uses cultivation and breeding of plants) relationship between people, plants, climate and landscape. Second, the tools needed to make washi are very simple, and are often shared among a community. All you need is: the basic plant fibers, a quantity of clean water, basic equipment, human knowledge or expertise, transport to the market (Turner 1983). Third, paper can be used for many things in everyday life, and can be easily recycled. This pluripotency and circularity of material flow is unique to paper, and not found as readily in other traditional Japanese materials. Fourth and finally, the current materials being used for biodesign—mushroom mycelium (Ecovative 2018) or Kombucha bacteria (S. Lee 2011)—are not yet aesthetically appealing or functionally sound enough to be brought to market for clothing[18], whereas paper already has a history in Japan of being used for garments. This examination of paper follows studies from other researchers who travelled from Europe to Japan to study washi for similar reasons to those outlined above.

Washi culture was investigated by Western researchers seeking new material technology in times of need. In the 19th and 20th centuries, paper was proposed as a potential alternative to cotton, and English Sir Harry Parkes (1828-1885) and German J.J. Rein (1835-1918) both visited Japan and conducted thorough research on washi and its various applications and production methods. The research outlined in this dissertation takes a different approach from Parkes and Rein—and is by no

[18] The aim of this dissertation is not to outline explicit propositions for material applications. Rather, it is to develop a useful theoretical and conceptual framework to inform sustainable practices in fashion design.

means as thorough or extensive in its scope—by identifying core concepts relating to the community-based practices in making the material, rather than approaching it as *ersatz* for fashion materials otherwise ethically unsound.

Rather, in order to contribute to the discourse on sustainable design strategies for fashion, the local and communal aspects of washi production and consumption will be examined as an example of a decentralized, locally sourced material production system which is contingent on both the human and the nonhuman entities in the immediate landscape—a model of how to design when producer-consumer and human-nature hierarchies are blurred.

Human beings are anchored to their landscapes and communities in tight tangles through material culture. In Japan, handmade washi paper is one example of how this process materializes, and traditional washi (paper) and *kamiko* (garments) offer insight into a specific method for fashion design that considers non-hierarchical relationships with materials based on embeddedness within landscapes and local communities. The fluid mechanics of papermaking, such as the relationship between the tools, water, pulp, and the movement of the papermaker as they produce washi from a vat of liquefied tree branches, dictates the shape and form of the final product. But the material qualities of the final form are also deeply connected to the community and the landscape each sheet of washi emerged from.

As a material, washi can be read in many ways. It can simultaneously represent: sacredness (it was used for ceremonial writing); rurality (it was made and worn by poor farmers for much of its history); luxury (now it is expensive and rare); decline (the number of papermakers peaked in the 1960s); national pride (it was awarded UNESCO heritage status in 2014); and complex community structures (it can only be made through collaboration, because the work is too difficult for one person).

1.3 Chapter Conclusion

This chapter outlined the theoretical and conceptual framework for this study. The aim of this chapter was to illustrate that there are hierarchical structures evident in fashion that generate unsustainability, and to review the literature surrounding them.

The aim of this chapter was to define and problematize two major hierarchical structures in the dominant fashion industry, in order to develop the foundations for a framework for consumer-led interspecies design methods for fashion—what is referred to elsewhere in this study as "interspecies design."

This chapter focused on two of the fundamental hierarchies that the dominant fashion industry is contingent upon—the primacy of producer over consumer, and man over nature. Koestler's (1967) conception of a "holarchy" offers a perspective on an alternative structure to the top-down hierarchy—one that focuses on the parts of a whole. Koestler's holarchy was further developed to include nonhuman organisms by using Stengers' (2010) notion of "entangled coexsistence."

The first section of the chapter dealt with the producer-consumer hierarchy, as a way of exploring how and why consumers are kept at a distance from the sites and materials of fashion production. It was shown that this hierarchical relationship makes it challenging for consumers to make ethical decisions when buying fashion. "Distance" may not be intentional on the part of the producers, and may result from the vertical disintegration of the supply chain—in the sense that designers may not know themselves where their designs are produced. However, this chapter showed that with increased access to tools and information enabled by network technology, consumers are developing networks of sharing and collaboration that challenge the existing hierarchies of top-down fashion production by reclaiming their agency through regaining the means to production.

The second section of the chapter outlined the human-nature hierarchy and identified that, in the West, a longstanding divide places the human as being *in* rather than *of* nature. Stengers (2010), Haraway (2016, 2011, 2007), and Næss (1979) ideate an alternative view of the human relationship with the systems of the planet as integrated and deeply embedded, because both are engaged in a process of reciprocal exchange. Their views help to re-frame definitions of "human" and "nature" in the context of the Anthropocene, and show that a more integrated view of nature can be useful in .

The third and final section of this chapter outlined why Japanese papermaking was used in this study, and how it can contribute to the development of alternative methods for fashion design. Japan offers a unique site for thinking through the problems of defining human, nature, producer and consumer and the role that making, design and technology play in disturbing hierarchies. Papermaking was used as a tool that invites a *recursive* understanding of the core research questions—recursive in the sense that the theoretical framework of the dissertation helps to reframe the traditional papermaking practice as proto-biodesign, and that the examination of papermaking as a case study elucidates the research questions. In other

words, through reframing an extant and longstanding practice like papermaking using contemporary qualities such as interspecies collaboration, openness, and transparency, this study helps to understand and potentially shape nascent design practices that seek to bridge the biological, social, and technological.

Chapter 2 - Designing Utopia: Bridging the Social and Technological

Aims of Chapter

This chapter provides the historical background and context to this study by exploring the implications of the Anthropocene on the design discipline. Literature concerning the state of design research will be reviewed to contextualize the concepts in this dissertation. Utopian thinking and speculative design are used to frame sustainable fashion and to contextualize the implications of this study within design studies to show the need for narrative, technical and social considerations to be addressed simultaneously in design practices.

2.1 Introduction

The scale of the Anthropocene is so vast—its multiple effects are not immediately visible to humans—that it requires narrativization to explore and approach. Mirzoeff (2014, 213) claims that humans cannot "see" the Anthropocene, but can only "visualize" it using data. This narrative question—how do we think through and see an "unthinkable" phenomenon like human extinction or anthropogenic climate change?—has been raised not only by those in visual studies, such as Mirzoeff, but also in literature studies (Morton 2010; Carraciolo 2016),

science and technology studies (Stengers 2010), and by design researchers and artists (Dunne and Raby 2013; JR. Lee 2011).

Marco Carraciolo, for example, is principal investigator in a European Research Council-funded research project called Narrating the Mesh—a reference to Timothy Morton's "metaphor for the interrelation between humans and a large gamut of 'nonhuman' realities, from the bacteria in our guts to macro-entities such as climate change" (Carraciolo 2016). Two of the questions Carraciolo is asking in this project are: "how can we narrativize entities that elude the human scale?" and "How can stories undercut anthropocentric ideologies and foster a sense of respectful coexistence with realities beyond the human?" Although Carraciolo's research focuses on the context of text-based narratives, it sheds light on the potential for new streams of design methods and research to create powerful, and potentially disruptive, narratives.

Designer researchers Anthony Dunne and Fiona Raby (Coles 2016), though not directly addressing the Anthropocene, have spearheaded methods for design narratives that border on the fictional, but question and visualize the social and ecological issues we face. These methods are part of what has been called "speculative design," "critical design," "design fiction," "anti-design," "discursive design," or "adversarial design" (Coles 2016, 47). Light, Powell and Shklovski (2017) succinctly

summarize the impetus for future-focused or speculative design methods and practices that try to visualize the Anthropocene:

> Technology designers and design researchers are implicated in this wave of change and uncertainty because we have claimed a stake in the production of futures. As makers, we can choose to have a role in producing alternative narratives for present generations of humans and those who depend on them, such as other species and unborn children. (2017, 1)

These design methods have a twofold effect: they help to identify the shape of environmental problem, and offer approaches or solutions to it. Since the Industrial Revolution, design movements have attempted to "offer a better way to live, many of which ... differ from a mainstream that is concerned primarily with efficiency and satisfaction of technical functioning" (Light, Powell and Shklovski 2017, 2).

In this chapter, the history and context of these narrative and speculative design methods, framed by the Anthropocene, will be reviewed in two sections: First, utopian socialism as a vehicle for speculation and cultural critique; and second, speculative design practices already engaging with similar methods of future-thinking.

2.2 Design

As a species, we have been designing since *Homo habilis* made the first human tools roughly 2 million years ago (Friedman and Stolterman in DiSalvo 2012, x). Over time, the tools that we have used to build humanity and shape the world have become more complex. The vast timeline of human development is punctuated by design

achievements: spears, agriculture, architecture, urban development, and digital technology. Design is now a defined field of research and practice that can take many forms, including industrial design, graphic design, textile design, fashion design, furniture design, information design, process design, product design, interaction design, transportation design, educational design, systems design, urban design, design leadership, and design management, as well as architecture, engineering, information technology, and computer science (Friedman and Stolterman in DiSalvo 2012, x).

Design has a range of definitions as both a noun and a verb—it carries meanings that denote purpose, intent, functionality, and efficacy. A design can be an elaborate plan involving thousands of actors or a decorative motif produced by an individual. Designer and activist Victor Papanek defines design as:

> The planning and patterning of any act towards a desired, foreseeable end constitutes the design process. Any attempt to separate design, to make it a thing-by-itself, works counter to the inherent value, of design as the primary underlying matrix of life. Design is composing an epic poem, executing a mural, painting a masterpiece, writing a concerto. But design is also cleaning and reorganizing a desk drawer, pulling an impacted tooth, baking an apple pie, choosing sides for a back-lot baseball game, and educating a child. Design is the conscious effort to impose meaningful order. (1971, 3, emphasis added)

Yet, design eludes succinct definitions and reductions: it can denote physical, social, or digital strategies, and takes place in different situations, both professionally and otherwise. The process of designing is internal—it is problem-solving akin to other natural human activities (Razzouk and Shute 2012). Following the development

of complex mechanical, electronic and digital systems during the past century, design as a profession has expanded in scale from an individual working on detailed design drawings, to teams working on specific parts of a larger system (Jones 1970). The smartphone, for example, is a complex tool that facilitates a way of interacting with the world, and positions the designer as a tool-maker who proposes a situation for living—smartphones and other personal technology have enabled people to remotely control and monitor some of the appliances in their homes. This innovation is part of what has been called the Internet of Things, which is manifest in new domestic devices like the Amazon Echo or Google Home.

Designers "reorganize our perception of the everyday, triggering new developments in domestic design" (cf. Petroski 1992 in von Busch 2012). It is this modernist paradigm of innovation, progress and growth—the idea that next product or idea will be an evolution and somehow better than what came before it, that has made design a "technology of perfection" (von Busch 2012, 444). On the one hand, this is dangerous because notions of "perfection" contribute to a tenuous system of value creation that renders older, imperfect versions useless, thereby producing an enormous amount of waste as people replace undesirable consumer goods (Thompson 1979). On the other hand, design can be a technology for rethinking existing processes and materials, by making social relationships more just or systems more materially efficient and transparent—innovation for the greater good, rather

than only the economic good of the producer. Fletcher (2014, 1) indicates that design is "not just [...] a stylist or shaper of things (though this too has an important role)," but is also "a promoter of social change."

While the sites, shapes and scales of design have changed, it remains constant that there are two main parties involved in designing: designer and user(s), who are traditionally engaged in a hierarchical system of value-creation and material exchange. According to Von Hippel (2005, 3), the designer (or manufacturer) will "expect to benefit from selling a product or a service," while the users are "firms or individual consumers that expect to benefit from using a product or a service." This system, however, has been slowly changing to include non-traditional participants in the design process, including the users (as in individuals, not firms) themselves. The consumers of fashion are also shifting the traditional designer-user hierarchy (or, in a wider sense, producer-consumer) in two ways: in response to invitations from designers to participate in the process of design and by innovating novel strategies for design and consumption themselves. Design, and designers have resisted the pressure to formalize methods into a single logical framework (Jones 1970, 3), and there remains at the core of design a desire to dream visions of possible—probable—worlds.

2.3 Design for Social Innovation

Design is not only the act of innovating tools and technologies—innovation can be social as well (Fletcher 2014). Herbert Simon's (1996, 111) definition of design, "[devising] courses of action aimed at changing an existing situation into preferred ones," denotes a broader scope of what can be considered design: Social situations, environmental situations, situations involving contingent relationships between humans and nonhuman organisms or between producers and consumers. Furthermore, these wider domains for design can be addressed through multiscalar interventions, i.e., at varying scales, from the micro- to the macroscopic. Manzini (2016, 55) indicates that "[i]n the twenty-first century, social innovation will be interwoven with design as both stimulus and objective...it will stimulate design as much as technical innovation did in the twentieth century, and at the same time social innovation will be what a growing proportion of design activities will be seeking to achieve." Benchmarks for what he calls "design for social innovation," include collaborative housing programs in Milan, peer-to-peer networks for the elderly in the UK, and the Slow Food movement in Italy. Manzini (2016, 62) offers the following definition of this burgeoning movement: "design for social innovation is everything that expert design can do to activate, sustain, and orient processes of social change toward sustainability." It is key now, in the context of anthropogenic climate change, that design practices envelope wider social and environmental issues.

2.4 Worldbuilding

Following Simon (1996) and Manzini (2016), if a designer makes a given situation into a more preferred one, they can create ideal social situations. But who is the subject in an ideal situation? Can it be assumed that the subject is human? In the context of the Anthropocene, it becomes necessary to imagine worlds in which the subject of the "ideal" planetary situation is expanded to include nonhuman organisms. As we enter a stage of Earthly change, it is important to imagine the future when engaging with design, to consider potential social, environmental and economic outcomes resulting from design decisions. Design propositions in this sense can be considered a form of worldbuilding—a concept well-known in science fiction writing and filmmaking (Willis and Anderson 2013, 380). Hollywood production designer Alex McDowell defines worldbuilding for cinema as "a process for creating 'a container for narrative, or for multiple narratives'" (McDowell, pers. comm. in Willis and Anderson 2013, 380). Filmmakers and fiction writers imagine the world surrounding a character, and a story emerges from the way characters interact with this world. The character is *in* and *of* the world that is created. Willis and Anderson (2013) illustrate this by using an example from filmmaking:

> Rather than beginning with a screenplay and moving step-by-step through the stages of preproduction, production, and post-production, the worldbuilding workflow privileged production design and the creation of a world from which

> stories may emerge. The process, then, moves *from* a world *to* the story. (380, emphasis in original)

Worldbuilding can be a starting point for methods in fashion design, too, and may be a tool that helps to develop a more socially just and environmentally sustainable industry. Taking cues from Willis and Anderson (2013), fashion designers can imagine the socio-political and environmental world in which the garments they design will be produced—including factors outside the conventional purview of the designer, such as color, shape, hand, etc. Then, garments can emerge from the specific set of parameters that define the world imagined by the designer. It could allow designers to make seemingly radical decisions seem possible: providing tools and services to consumers, rather than products; using biotechnology for textile design; making wound-healing textiles; or inviting nonhuman collaborators into the design process. Worldbuilding as a design tool or starting point for design allows designers to promote new worlds and ways of living through their designs.

Figure 3 - Dunne and Raby, "Design for an Overpopulated Planet: Foragers," 2009. (Dunne and Raby 2018).

Criticality is built into any design practice as a critique of previous innovations and even society itself is inherent in new designs. This criticality is especially evident in the case of design practices which Dunne and Raby (2013) call "speculative design." To Dunne and Raby, speculative design is a design proposition which is used to "characterize a kind of design that's imagining alternative futures that are often technological in makeup and so seem to be very closely related to science fiction"

(Coles 2016, 47). These designers are not making design objects for pure utility or aesthetics, as Dunne explains, but to promote a design method with a "broader context of critical thinking...provoking complex and meaningful reflection" (Dunne 1999, xv). In an interview, Dunne (Coles 2016, 59) would later ask "why can't design, alongside cinema, literature, and all these other areas, feed into the mix of impacting people's imagination and perception of things. We want to explore what design specifically can bring to this equation." In other words, speculative designers engage in creative worldbuilding, proposing new ways of living—facing the future and the potential ecological problems that will arise.

In their 2009 work *Design for an Overpopulated Planet: Foragers*, Dunne and Raby escalate a present-day situation to conceive of a world that is running out of food due to overpopulation. According to the designers (Dunne and Raby 2018), "the assumption is that governments and industry together will not solve the problem and that groups of people will need to use available knowledge to build their own solutions, bottom-up." Their response is a group of design objects—"DIY devices"—that mimic the digestive systems of nonhuman animals in order to take advantage of available food resources that humans are not evolved to digest. Catterall's (2017, 32) perspective contributes to the understanding of speculative, or "anticipatory" design, in that such design "can play a vital role in a necessary reorientation of values, moving away from a value-system shaped by the undue importance placed upon Gross

Domestic Product as 'the' indicator of a nation's health to one informed by a more all-encompassing measurement of society." Designers engaging in speculation and worldbuilding are constructing new worlds and designing the tools, objects and lifeways for these new worlds.

To explore design's efficacy in creating ideal social situations, the concept of utopia—"the purest form of fictional world" (Dunne and Raby 2013, 73)—will be used in this chapter to trace a line from early designers concerned with ideal social situations to contemporary speculative design and sustainable design practices. Early utopian writing from the late 19th century—such as Edward Bellamy, Charles Fourier and William Morris—focused on socio-political egalitarianism and promoted the social elements of design in order to bestow political agency on the common man. Later, postwar thinkers like Buckminster Fuller and Victor Papanek developed proposals for living and designing that went beyond the socio-political aims of the 19th-century utopianists, to address growing environmental issues.

Utopia is a useful frame in which to build the argument for sustainable fashion, as it allows for fiction and reality to inform one another. The synthesis of sustainability and utopian thinking suggested in this current study is being explored under the moniker of "speculative design," which will be further discussed later in this chapter.

2.5 Utopia and Fashion

Fashion, as a global interplay of narrative and embodied practices, is a constantly shifting showcase of utopian proposals for the way one should look and live. Brands, for example, research the desires of their consumers, and target them with specific messages. These utopias are often short-lived, and promoted through advertising, branding and PR campaigns in which the idealized images of the world—aspirational vignettes—are presented as just out of reach, yet attainable through purchase. The notion of an attainable utopia, an aspirational world, is mobilized differently by conventional and sustainable fashion brands. Studies have shown that in the media of some conventional fashion brands, marketers and designers promote specific body shapes for women (Sypeck, Gray and Ahrens 2004; Turner et al. 1997). In sustainable fashion, designers try to consider social and ecological ramifications by proposing designs which reflect their considerations. Modular cutting, for example, is a physical representation of a sustainable design which imagines a world where the consumer repurposes their garments; design for biodegradability imagines a world where the ecological footprint post-use is lowered, or the disposed garment even ameliorates the soil. The utopian visions of both conventional and sustainable fashion brands can be presented through media and garments.

Both conventional and sustainable fashion practices are engaging in the fundamentally utopian act of design—making ideal situations real—but with differing

underlying ideologies: capitalist for the former, environmentalist for the latter[19]. In practice, differences between design in conventional and sustainable fashion brands are not to be overstated.

Clarke (2008) identifies the contradictory relationship between the capitalist enterprise of fashion and sustainability, positing that "slow fashion" is an "oxymoron," as it is still underpinned by capitalist ideology and concomitant values of production and growth, which are in direct opposition to those of what Schwarz and Krabbendam (2013) call "the sustainists"—people who make efforts to promote and support of sustainable ways of living. Regardless of the ideology that drives different branches of fashion design, bigger reduction goals—in terms of water usage, environmental pollution, social inequality—can only be achieved through design via policy and social change. Design can not be removed from the political ideology of the designer, their firm, brand, society, or governing body. Van Helvert succinctly describes the relationship:

> Wherever design is employed as a solution to a problem, politics are irrevocably involved, be it in the choice and formulation of the problem, or the aesthetical, productional, and material values in the designed solution. [...] design [...] is never above ideology, but instead needs a stronger political awareness if it is to constructively move forward on complex social and environmental issues. (2016, 27)

Design, and especially fashion design is a highly adaptive discipline that can use worldbuilding and fiction to promote specific socio-political aims. Fashion

[19] The two—capitalist and environmentalist—are not mutually exclusive positions, but making the distinction here helps to illustrate the point that utopia is subjective.

designers imagine worlds that are anachronistic (maybe ahead in time by one year, since the time between design and retail can take months[20]) or even radically different (Alexander McQueen or Martin Margiela were both fashion designers who pushed the boundaries and challenged dressing conventions). In the next section, utopian thinkers will be introduced to develop the possibilities of fiction in design practice, specifically in propositions that bridge the social and technological.

2.6 Utopia and Sustainable Fashion

Art, design and the natural sciences have a lot in common. These disciplines attract people who can turn their intuition about the state of the world into questions and action. Take Italian futurist Luigi Russolo, for instance. He was shocked by the bodily experience—the noises and smells—of the industrialized city at the end of the 19th century. He reacted to the destruction of his familiar countryside by creating a series of aggressive sound art pieces called "*Intonarumori*." His work utilizes crude noise-machines that make mechanical, violent sounds. These sounds could be bird-like response-calls to the sounds emitted from the factories and machines of this new period. As long as industrialization has been changing the natural environment, artists and designers have been reacting to it. The world has changed greatly since Russolo's time and will continue to do so, and the Anthropocene shows us that changes could be detrimental to both humans and nonhumans, or provide a space for

[20] Lead times have shrunk considerably thanks to information technology and the fast response time of factories. Fast Fashion brands such as H&M, Zara and Uniqlo can have leads time of months or even weeks. See Cachon and Swinney (2011) for their investigation into what makes fast fashion "fast," and profitable.

emergent possibilities. Designers now are looking at the changing landscape and asking how we can design new ways of living with the changes (Shotwell 2016).

While not all fashion designers are worldbuilders, and not all fashion design is utopian, some proponents for sustainable fashion are engaging in creative worldbuilding. Those who push for environmental sustainability are enacting a kind of utopianism, in that they imagine worlds that do not exist, and argue for their potential. Even if such worlds seem impossible or unattainable, it is important for designers to imagine possible future worlds (Wood 2016), especially as part of a methodology. Design in this context takes a new meaning. Catterall identifies the role that designers play in shaping the world:

> We designers participate in the generation of surfeit, creating artifacts, the vast proportion of which come into existence in order to support national economies employing the insidious practice of stylistic obsolescence. In executing this mission and accepting these practices, we designers actively participate in the continued depletion of natural resources, accelerated environmental degradation, and are complicit in mass global human rights violations. However, we designers might alternately employ the skills at our disposal to design and distribute artifacts that initiate new, ethical, and sustainable practices. (2017, 31)

To design theorists Dunne and Raby (2013, 69), the role of design is not only to manipulate raw materials into form for a utilitarian or aesthetic purpose—following Louis Sullivan's "form follows function"—but it is a process of imagining new ways of living in response to the pressing social or environmental issues of the day. The researchers, designers, and professionals who create proposals for sustainable fashion tease the limits of their effectiveness, with realistic expectations of the potency of a single brand, journal article, speech, television program, PR program, symposium, etc. Their utopian vision may not be achievable immediately, or at all. The utility of utopia when used as a tool for question lies in the fact that it can act as both a mirror to our current practices and beliefs, and a gateway to a more environmentally sustainable and socially just future. Light et al. (2017, 1) acknowledge the effect that speculative and utopian design can have on human and nonhuman subjects:

> Technology designers and design researchers are implicated in this wave of change and uncertainty because we have claimed a stake in the production of futures. Makers can choose to have a role in producing alternative narratives for present generations of humans and those who depend on them, such as other species and unborn children.

Sustainable fashion studies could benefit from reassessing the fundamental way that the dominant fashion industry deals with nature in both its extractivist resource-use paradigm, and its tendency to produce offshore and ship materials great distances. The research in this dissertation presents a conceptual framework for a fundamental shift in the way that natural materials are considered in fashion design. This approach, continued below, is guided by a simple question: How can fashion reconsider ecology?

Ecology and Ecomodernism

The etymological roots of the word "ecology" are Greek: *oikos* and *logos* mean "home" and "speech" respectively. Together they make a word that can be roughly translated as "speaking about the home." Generally, it refers to a field of research in the natural sciences that studies the contingent relationships between living things and their environments. Ecological philosopher Arne Næss (1979) argues that contingency in this sense can be understood through a "relational or total-field image," which uses a monist (man and nature as one) rather than dualistic (man and nature as separate) view of the world. In the 1960s, Næss helmed a new branch of ecological research called Deep Ecology that sought to critique a science of "shallow ecology," which Næss later characterized as "concerned only in part with pollution and resource depletion" (1979). He argued that there are "deeper concerns which touch upon principles of diversity, complexity, autonomy, decentralization, symbiosis, egalitarianism, and classlessness" (1979, 95). "Ecosophy" is also a term coined[21] by Næss (1973, 99), which he defines as:

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[21] The term was also used by Félix Guattari, in his text *Three Ecologies* (1989), referring to the three ecologies laid out by Gregory Bateson in *Steps to an Ecology of Mind* (1972), but a complete analysis of this term is beyond the scope of this study.

> ...a philosophy of ecological harmony or equilibrium. A philosophy as a kind of *sofia* wisdom, is openly normative, it contains *both* norms, rules, postulates, value priority announcements *and* hypotheses concerning the state of affairs in our universe. Wisdom is policy wisdom, prescription, not only scientific description and prediction. (1973, emphasis in original text)

While a Deep Ecology approach may not be entirely suitable for the fashion industry, the postulates of Næss's theory can be used as a framework for positive action toward a sustainable and just fashion design practice which works *with* nature. Ecosophy, and ecological thinking in the broader sense, is at the core of this dissertation, to adopt an integrated perspective on fashion materials and consumers.

Current proposals for sustainable design or industry practices are dominated by a "technocratic approach" (van Helvert 2016, 21) which consider technology a "panacaea" (Prior et al. 2007, 17) for environmental sustainability. Van Helvert (2016, 21) elaborates, claiming that "[t]he ideology that speaks from many examples of socially committed design today is one that is based on the belief in the power of design and technology as the determining forces in solving the most challenging issues before us." A technocratic and solution-driven approach to environmental sustainability can be dangerous. Rickards (2017) criticizes the techno-utopian thinking of "ecomodernists" who speculate on a future in which we continue the modernist trajectory of dominance over the natural landscapes of the planet.

Two of the core values of modernism are progress and growth, yet both rely on resource inputs. This is one of the fundamental failures of the modernist project—the idea that perpetual growth could be achieved on a planet with renewable, yet finite resources. Now that we are faced with the limits[22] to those resources, groups such as the "ecomodernists"

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[22] A warning call was sent out in the 1970s with the publication of *The Limits to Growth* (Meadows et al. 1972), which calls for an end to unchecked growth and industrial progress. The book—which was updated in 2004 to mark its 30th anniversary—uses quantitative models to map the future of interactions between human beings and the complex ecological systems of the Earth based on five factors of growth: global population, industrialization, pollution, food production, and resource depletion. The findings position unchecked growth as a dangerous drive that leads to collapse. In

have emerged—such as members of The Breakthrough Institute, a Californian think tank—who propose technologically-driven solutions to reconciling modernism and environmental conservation. Their tenet is "to illuminate pathways to 'decouple' the link between human development and environmental destruction" (Breakthrough Institute 2016). To ecomodernists, "decoupling" means to "separate human development from environmental impacts" (Ecomodernism.org 2017, 7) to have a "good" Anthropocene. In other words, they call for rapid urbanization, increased development of technological apparatuses, and a move *away* from the land—or "taming" it, to borrow from Payne (2017)—toward accelerated technological intervention between people and nature. The ecomodernists write about decoupling in their co-authored manifesto:

> Decoupling occurs in both relative and absolute terms. *Relative* decoupling means that human environmental impacts rise at a slower rate than overall economic growth. Thus, for each unit of economic output, less environmental impact (e.g., deforestation, defaunation, pollution) results. Overall impacts may still increase, just at a slower rate than would otherwise be the case. *Absolute* decoupling occurs when total environmental impacts—impacts in the aggregate—peak and begin to decline, even as the economy continues to grow. … Decoupling can be driven by both technological and demographic trends and usually results from a combination of the two. (Ecomodernism.org 2017, 11)

Economist Tim Jackson (2015, 84, 87) summarizes relative decoupling, saying that it "is about doing more with less: more economic activity with less environmental damage; more goods and services with fewer resource inputs and fewer emissions," and he clearly states that it signifies a healthy economy, but it doesn't signify a reduction in resource use or environmental pollution (2016, 84). Absolute decoupling, on the other hand, is the somewhat utopian dream that economic growth continues while emissions and resource extraction decline. The "demographic trends" that the above quote refers to are economic and population growth. Growth, not in population but in the modernist drive for economic growth

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every model—in both versions of the text—the researchers tested, the Earth cannot withstand unchecked growth.

at any cost, is at the core of much ecomodernism thinking. Jackson (2017, 87) calls decoupling a "myth," and cautions accepting at face value that "economic growth will, if left to proceed along anything like its usual course, lead to higher efficiencies and lower emissions." Environmental activist and writer George Monbiot says the thesis that modernism can progress undeterred by environmental collapse is an unattainable "utopian" dream (Monbiot 2015). Utopia can be a dangerous tool if wielded by the wrong people.

While some proposals for sustainable communities involve a romantic return to preindustrial society or rurality (Papanek 1971, 187), the vision of the future laid out by the ecomodernists is moving in the opposite direction. They envision a deeply urbanized landscape with only large-scale farming operations, as opposed to small-scale operations, which they claim fail to "alleviate poverty or compete with alternative land uses like intensive farming because of the very low incomes earned from harvesting these ecosystem goods" (Breakthrough Institute 2015, 9-10). Monbiot rebukes this argument, pointing to the 1962 work of Amartya Sen on small-scale family-run farms in India. Sen found that smaller farms produce a better yield than larger ones. This could be because the family-run farms spend more labor per hectare, but don't spend the money because the labor comes from members of a family (Monbiot 2002).

The thesis of "enoughness" in sustainability rhetoric could be expressed in a shrinking of the desire for growth and progress, or "prosperity without growth" (Jackson 2017). Both Jackson and Monbiot have deep criticisms of the perspectives espoused by the ecomodernists, not because they think they are fundamentally wrong, but because they are too "blindly optimistic" (Jackson 2016, 104). The Anthropocene cuts down this positivist future-focused techno-optimism and demands a reassessment of not only design and industry practices, but of the fundamental relationships that fashion designers have with nature.

How can these deeply subjective utopian visions be reconciled? The next section outlines some of the history of utopian thinking and how it intersects with the design discipline to promote a design method that straddles the socio-political real and not-yet-apparent.

2.7 Producer and Consumer: Utopian Socialism

The word "utopia" comes from Sir Thomas More's 1516 book of the same name, in which a sailor travels to a perfect place—"the best of all possible worlds"—and tells the tale of his travels upon his return home. More merged the Greek words *outopia* (meaning no-place) and *eutopia* (meaning good-place). It's a dark joke: a good place that is no place, because a perfect place cannot exist. Despite the many shapes, alternatives, and themes that have taken the title "utopia" over the years, one essential condition remains: utopia is unattainable because it does not exist. Foucault (1967) describes them as such:

> Utopias are sites with no real place. They are sites that have a general relation of direct or inverted analogy with the real space of Society [sic]. They present society itself in a perfected form, or else society turned upside down, but in any case these utopias are fundamentally unreal spaces. (1967, n.p.)

Though they are unreal, and, more importantly for this study, unrealizable, the notion of utopia is a useful tool for generating desire and for asking questions: Utopia has been used by scholars and writers to identify and criticize political and social conditions. A utopia expresses the desire to dream of a better world, and could motivate people to propose way of realizing such worlds—for better or worse, as in

Plato's Republic or the ecomodernist desire for decoupling. This human desire is summed up succinctly by Levin (1994 in Coverley 2010, 9), reflecting on the process of putting together a compendium of utopian writing:

> ...the idea of a perfect world had, through the ages, embedded itself inextricably in the feelings of the human race. The more I searched for examples, definitions and hopes, the more all-enveloping did the idea become. The range of utopias was, as far as I could see, infinite, and any kind of catalogue would have been impossible, if only because utopias are, amoeba-like, capable of indefinitely dividing themselves in half. (2010, 9)

Utopias and their complementary dystopias are imaginary worlds. Both are absolutes—a utopia is a vision of absolute perfection, while a dystopia is absolute corruption of life, society, and politics. While they are opposites, they can also exist simultaneously within the same society. There are dystopian shades in any utopian work, such as Le Corbusier's monoculture vision of modernity and progress or the indentured slaves supporting the perfectly harmonious society in Plato's Republic. This transformation also holds true when design becomes a tool for worldbuilding. As indicated by van Helvert (2016, 22), "[d]espite the ambitions of the modernists, [design] can never be universal, neutral, or innocent, and is on the contrary often concerned with promoting some values over others." In the case of the dominant fashion industry, the result of the utopian impetus toward high turnover of low-priced clothing has caused unintended dystopian consequences. Low costs, high turnover and relaxed regulations means that consumers always have access to new styles and producers make a profit, but the result can be dangerous for the socio-ecological

systems at the sites of production, and contributes to a surplus of clothing that, after use, may end up in locations far from the centers of production, such as Poland, Pakistan, Ukraine, and Benin, and can prevent the development of, or even destroy, a local textile or apparel industry[23] (Goldberg 2016; Brooks 2015).

A utopian world can only ever exist in relation to the real world, so the notion of utopia offers a tool to look critically at the world, or to ask questions about potential futures. The efficacy of a utopian vision is not measured by its ability to predict the future, but an ability to synthesize the current state of the world, and to offer critique. Wood (2016, 3) argues that, while a utopia is an idealistic and unrealistic dream, it is important to "dream of alternative futures, even if they seem unrealisable or impossible."

Wood's (2016, 3) definition of utopia is "a more tentative, temporary, pluralised or truncated version than the ones we may find in the picture books" which is predicated on the pluralization of narratives, of smaller and self-governed systems or distributed agency he calls "micro-utopias," (2016, 4) which can be likened to Koestler's holons. He calls for a bottom-up approach to a "democratic system that depends less on representation and more on a distributed mode of actions and responses" (2016, 5). Coles (2007, 13) has a similar sentiment and presents the notion that the utopia and the collective are often "intertwined." It is this link—between utopian thinking and the political effectiveness of the small-scale community—that is important to this dissertation, because of its implications for developing sustainable design methods.

The style of utopian thinking that provides the backbone for sustainable fashion and speculative design proposals goes as far back as the post-17th century Industrial Revolution

[23] See Tranberg Hansen (2008; 2000) for an in-depth analysis on the trade of Western imports of second hand clothing in Zambia and its effects on local culture.

to the turn of the 20th century. During this time, industrialization and automation threatened local landscapes and craft communities, and as early as the 16th century, Queen Elizabeth I denied William Lee a patent for his stocking-knitter, because she was worried it would put traditional hand-knitters out of business (Conniff 2011). The feeling began to emerge that machines would replace human workers and damage the environment (Galluzzo 2017). William Morris, a socialist who "inherited from John Ruskin the idea of labor as a form of artistic expression that is vital to human dignity" (Miller 2016, 30), was witness when mass-production began changing the landscape of the countryside and longstanding patterns of artisanal patronage and local production. William Morris reacted to these changes, and believed a trace of the worker's hand should be visible in all responsibly created objects. In his 1890 novel *News from Nowhere*, Morris outlined his proposal for a future world. Morris's utopia is an imaginary future but finds its roots in an imaginary past—a "golden age before the invention of large-scale cities, agriculture, weapons and industry" (Wood 2016, 2). Its people all held meaningful work, and "pursued design and production in the material world in a manner consistent with moral and ethical values for the benefit of wider society" (Wood 2016).

Novel community structures were a key element of early 20th-century utopian socialist writing. Charles Fourier (1772-1837), who included architectural designs and social organization along with his ideological and economic plan, imagined independently governed small-scale cooperative communities he called "phalanstery." His designs were implemented at various scales across the United State in the early 20th century. Robert Owen (1771-1858) was a contemporary of Fourier, and simultaneously they developed the cooperative communitarianism movement. The movement's philosophy is based upon in the belief that a person's social identity and personality are largely molded by community relationships. "Communitarian" was coined in 1841 by utopian socialist John Goodwyn Barmby (1820–

1881) who used the term when referring to other utopian socialists and idealists who experimented with communal lifestyles. Their utopia was a return to an imaginary pre-industrial past that no longer existed, and may never have. Despite this, the radical propositions of these utopian thinkers were executed in some parts of the United States, and some Fourierist communities flourished for decades during the 19th century. These thinkers, along with Ruskin and Morris, imagined a way of life that, at the time, was difficult to attain, requiring a significant amount of money and effort to achieve.

Morris was called a hypocrite by his detractors—he purported to support the artisan, and extolled the virtues of handwork, yet he produced prohibitively expensive books on his Kelmscott Press which were likely only bought by the wealthy (Miller 2016, 30). Criticisms of utopian socialist-style ideas continue today; the sustainability movement has been criticized as only for people who can afford it (Cosslett 2014). Terms like "organic," "sustainable," and "ethical" have entered the branding lexicon for luxury goods (Bain, 2017), increasing their bourgeois appropriation and exoticization. The process of appropriation causes such words to lose their meaning and become tools for brands to align themselves with desirable social trends. Even the word "sustainability" itself, while having been identified as an important concept and area of research, has become nebulous and difficult to define, making solutions difficult.

Despite the best efforts of Morris and his contemporaries, arts and crafts gave way to large-scale mechanization and mass production built upon economies of scale —the dream of neoliberal capitalism and the pursuit of self-interest. A similar movement appeared in Japan during the 1920s and 30s that exalted the mundane and handmade, through the efforts of philosopher Yanagi Soetsu and potters Hamada Shōji and Kawai Kanjirō. This group was instrumental in producing of the *mingei*

movement ("*min-*" meaning "the people," and "*-gei*" meaning "craft"), in which a Japanese pastoral utopia—built upon an idealized view of Japan's pre industrial history—was presented to urban elites who desired handmade instead of machine-made objects (Yanagi 1972, 217). To Yanagi, products handmade by craftspeople are "really human," (217) in that they are not mass produced, like many of the products made in Japan during the 1920s. The pastoral utopia that Yanagi and his group were promoting was operated by local communities, which he saw as the antithesis to the modern era: "Our world is bereft of group, or communal art; we have lost faith in so much of all but private interpretations of life's meaning" (Yanagi 1972, 89). Yanagi promoted not only the way of making crafts but also its peripheral philosophical concerns. Economic historian Thorstein Veblen's (2012 [1918]) criticisms remains useful for analyzing the mingei movement. To Veblen, writing at the turn of the 19th century, handmade craft products boast a crudeness unique to goods crafted by hand:

> Hand labour is a more wasteful method of production; hence the goods turned out by this method are more serviceable for the purpose of pecuniary reputability; hence the marks of hand labour come to be honorific, and the goods which exhibit these marks take rank as of higher grade than the corresponding machine product. Commonly, if not invariably, the honorific marks of hand labour are certain imperfections and irregularities in the lines of the hand-wrought article, showing where the workman has fallen short in the execution of the design. The ground of the superiority of hand-wrought goods, therefore, is a certain margin of crudeness. This margin must never be so wide as to show bungling workmanship, since that would be evidence of low cost, nor so narrow [160] as to suggest the ideal precision attained only by the machine, for that would be evidence of low cost. (Veblen 2012 [1918], 97)

However, Yanagi promoted a material-making and craft-producing culture based on communal engagement and cooperation—it was not only the physical attributes of the thing that he was interested in, but the world, the landscapes and communities, from which they came. Traditional craft practices like pottery, for example, are dependent on community support and involvement. Moeran's (1997, 108) ethnographic account of potters in Onta, a village in the south of Japan visited by Yanagi in 1931 (Moeran 1997, 27), shows that local potters depend on large families, or community facilities—their work is contingent not only on the local landscape, (mud, soil, water) but also community support and access to communal tools. For example, they may prepare their pots individually and then fire them together in one large communal kiln, taking turns to keep the fire lit and the temperature stable. By firing pots together, in an evenly-distributed kiln, their incomes are also kept relatively similar, and their standard of living the same.

Yanagi's vision of the future held that the age of individualism would end, and that the artist "should have the social consciousness to supply social demand; mechanical industry needs his co-operation" (Yanagi 1972, 220). This sense of communitarianism was strong in Yanagi's desire to relocate the oversight of production to workers, rather than asking them to become machine operators with "little or no privilege to select the materials as well as the designs" (Yanagi 1972, 219).

In his vision of industrialized production, the agency of the machine operator is reduced to their functionality and efficiency in the chain of production. The individual artist, however, has the responsibility for "leadership, guidance, and protection" (Yanagi 1972, 220) of many artisans of towns and villages to set an example through action. He understood the need for locally run craft co-ops to be formed, for cooperation among community members, and for artists to avoid engaging exclusively with the world of high art and intellectual pursuits or becoming custodians of the machines of industrialization. Instead, he felt they

should become active members of their communities. In the end, Yanagi's vision for an ideal future world was, akin to that of Morris, a social, craft-based utopia in which the individual is part of a community where their decisions benefit themselves and others:

> Once tradition has died out, it is necessary for individual artists to work in place of the tradition. Their purpose, however, must not be to work for themselves or by themselves, but to prepare the way to make a new tradition. For that reason it is desirable that they have a strong social consciousness. (Yanagi 1972, 221)

Mingei would later be appropriated by the Japanese government to promote local craft goods domestically, and they would coin the term *kōgei* to replace it. Kida (2010, 19) identifies that the new term—coined in 1954 to describe the works in the Japan Traditional Handicrafts Exhibition—was "infected with a strain of Japanese nationalism ... and was … an attempt to form a new genre, which was intended to be equal of 'art craft' (*kōgei bijutsu*), a field that had been defined in the 1920s based on concepts from Western European art."

According to Murata (2015), kōgei is now a tool for the proliferation of Japanese nationalist identity, or soft power, in other countries. In 2010, the Japanese government started a campaign called "Cool Japan" that confused the economic and social valuation of craft products. This project is a large-scale initiative funded by the Ministry of Economy, Trade, and Industry, which established the Creative Industries Promotion Office to promote Japan's culture industry overseas—what Mcgray (2009) called Japan's "soft power[24]." Of the products that express Japan's soft power, Mcgray included animation, cell phone art, fashion, sculpture, anime, films, elaborate graphics, popular action figurines and models, electronic music, and sound and light installations. The Japanese government adopts a similar scope on cultural exports, and focuses on projects that are already popular overseas such Japanese food, anime, manga, music, films, design and fashion (The Japan Times 2010). The handmade

[24] The term "soft power" was first coined by Harvard dean Joseph S. Nye, and means "the nontraditional ways a country can influence another country's wants, or its public values" (Mcgray 2002, np).

washi and kamiko industries are supported by this value-creation system, as they are tangled in the discussion of regionalism and authenticity.

2.8 Man and Nature: Utopia and Sustainability in the 20th Century

This section connects the Western utopian thinkers of the 19th century to the Californian eco-utopians in the 1960s to show that community and social innovation can meet environmental concerns. Against the backdrop of rapid growth during the mid-20th century, the last vestiges of 19th-century utopian socialism gave way to different forms of future-dreaming in the West, which had a decisively capitalist ideological stance. According to van Helvert (2016, 108), "[d]esign became primarily a means to sell a product, rather than improve it." Slight changes were designed into products to make them seem fresher and more desirable. Van Helvert (2016, 108) indicates that European designers working during the first half of the 20th century followed socialist doctrines "with the utopian intent to change the lives of the population for the better through design." Designers used utopian thinking as a tool to better the lives of consumers, but this practice changed by mid-century when design had become ornamental, rather than functional and designers had lost some of their earlier utopian zeal. This change is correlated with a significant rise in human activity—urbanization and industrial development in the decade following World War II (Steffen et al. 2015). This period, named "The Great Acceleration," is considered by Steffen et al. (2015) to be the most convincing starting point for the Anthropocene.

It was also during this time that consumer society experienced rapid growth, especially in North America and Western Europe, as designers made slight changes to products with the goal of making them seem fresher and more desirable. As consumerism accelerated, reactionary movements against it began to emerge.

Consumer-led design interventions find their roots in the counterculture DIY movements of the 1960s (Anderson 2012; Brand 1968) and may have informed the current culture of collaborative consumption. The post-war period brought mass-industrialization and –production, and criticism of changing production methods. During the postwar economic boom in North America, cheap manufacturing boosted the economy and made clothing and other consumables easier to access and more affordable (Schwab 2016). As the rest of the world rebuilt after the war, the United States exported their products, "spreading its material and ideological influence around the world" (van Helvert 2016, 108). Papanek (1971), a proponent of human-centered design, was critical of the trajectory design was taking in this era. His was also a utopian/dystopian vision of the world that asked how consumers and non-professionals can participate in the design process[25]. Papanek (1971) criticizes the mass-production of the 1960s and claims it led to overconsumption and poorly designed and manufactured goods. His thinking underpins the imperative for social responsibility that we currently see foregrounded in design today, as his central thesis

[25] See also Toffler (1980) and McLuhan and Nevitt (1972), for early predictions of consumer-led design and production.

was that design was no longer concerned with "imposing meaningful order" for the betterment of human society, but it had been reduced to a tool for marketers to sell more products. The imperative to sell more had negative effects on the environment due to the overextraction of resources resulting from mass production and Papanek proposed abandoning "design for profit" and embracing compassion when creating (Wood 2016). The postwar period was a time of change in which not only new material developments, but new communications and processing technologies were being developed that would push industrial production even farther away from Papanek's vision for design.

The 1960s ushered in the "third industrial revolution," characterized by the "development of semiconductors, mainframe computing (1960s), personal computing (1970s and '80s) and the internet (1990s)" (Shwab 2016, 7). The third industrial revolution—the digital revolution—stimulated the imagination of researchers, and several forward-thinking proposals were laid out in response to increasing access to information and the greater ability for humankind to process data through computing. Information technology, especially following the development of the internet by American scientists, allowed for information to be shared. Computer code was openly shared by academics and programmers in its early days, which nurtured innovation and development. The digital revolution presented an image of a bright, optimistic future during the turbulent 1970s—an era colored by the Vietnam War and the first oil crisis (Rifkin 2011).

Today, the early results of digital revolution have taken shape, and users have access to a wide range of tools that enable them to share with each other. This raises the question: Can homes or communities become sites of a small-scale primary industry?

Papanek (1984) predicted the consumer-led peer-to-peer networks of exchange—known as "collaborative consumption" and a key aspect of the "sharing economy"—that will be discussed in chapter 3. In a radical shift against top-down industrial capitalism, consumers in the sharing economy are embodying a radical way of consuming by embracing openness (and open-source), demanding transparency, and collaborating with one another on an unprecedented scale (Joyner and Park 2017; Barnes and Mattsson 2016; Belk 2014; Botsman and Rogers 2010). These ideas have spread and today they are manifest in brick-and-mortar co-working or co-making spaces run by like-minded individuals—including those running "maker spaces" like Tokyo's FabLab and Makers Base—who believe that access to tools should be part of a healthy community and can even *create* new communities.

2.9 Chapter Conclusion

The central thesis of this chapter is that design for social justice and environmental sustainability needs to bridge the technological and the social, and that design can be a powerful tool for narrativization. The historical background and context for this study is the Anthropocene and its effects on design in general, and sustainable fashion design in particular. In the first part of the chapter, design is presented as a technology of need-fulfillment and desire-creation, and a tool for asking questions. The Anthropocene opens cracks in modernity—specifically hierarchies mentioned above that fashion is contingent upon—and allows people to narrativize the enormity and invisibility of anthropogenic changes to the environment. These are some of the wider implications of this study, which were contextualized by, Industrial Revolution-era 19th-century utopian thinking, speculative design narratives (Dunne and Raby 2013), and Manzini's (2016) concept of design for social innovation. The suggestion we destabilize longstanding hierarchies is not an invitation for a romantic return to a pre-technological, pastoral past. Technology will play a central role in

any solution. However, the central thesis of this chapter was that designing in a more socially just and environmentally sustainable way requires a union of technological and the social. This dissertation takes the position that no "good" Anthropocene, will be engineered through purely technocratic solutions, as ecomodernists hope; the Anthropocene is an age of violence and disruption for biotic life that shows us the effects of rapid- and mass-industrialization and it destabilizes long-held modernists narratives.

The idea of utopia as a better place that lies just beyond our reach, but which we can aspire toward, might be a strong tool in contemporary proposals for sustainable fashion. Sustainable fashion design, through narrativization and utopian thinking has the power to propose alternative worlds and ways of living; however, it may not be the designer's responsibility to always provide concrete solutions for sustainability. Rather, “by focusing on propositions rather than solutions, artists and designers can challenge heroic, solutionist and masculinist narratives of the Anthropocene, instead provoking dark discussions and radical thought experiments” (Anderson 2015, 339). Perhaps this is the most important step to take towards sustainability in fashion: to tell stories, and to imagine better futures. Based on an investigation of leading research into sustainability, Catterall (2017) suggests that “radical and systemic changes will be needed and can arguably be introduced more effectively from the ground up by multiple independent actors.” Although consumers play a clear and significant role in making changes that lead toward sustainability in the fashion industry, there has been little research into this situation. And yet, the Anthropocene calls for radical propositions for alternative fashion design practices that will restructure the fashion industry. This dissertation responds to this need by developing an innovative and unique framework for bottom-up system change. This doctoral research identified utopian thinking was one foundational concept to creating alternatives to the dominant fashion industry.

Chapter 3 - Do it Yourselves: Consumer Agency Through Community

Aim of Chapter

How are consumers reclaiming their agency in the fashion industry? This chapter addresses this question—RQ 1—to further consider the main purpose of this study: How can a socially just and environmentally sustainable alternative to the dominant fashion industry be developed through a fashion design method contingent upon local communities of human and nonhumans?

This chapter aims to show that alternative design and consumption methods—one direction for building a more ethical and environmentally sustainable fashion industry (Fletcher 2012 in Catterall 2017, 34)—can be developed by problematizing the roles of producer and consumer to return agency to the consumer. This will be done by first questioning the producer-consumer hierarchy through a review of novel consumer-led or -inclusive consumption schemes. It will be identified that these promote consumer agency because they are predicated on qualities that open the production process and encourage individual or community-based production. The qualities that will be discussed are: collaboration, openness, and transparency. These can be identified as key qualities related to trends characterized by peer-to-peer and collaborative forms of consumption (Schwab 2016; Rifkin 2013; Botsman 2010). Each of these qualities will be examined in two ways: how each quality manifests in contemporary art and design practices, and how each manifests in traditional Japanese papermaking. The former analysis is through a literature review, and the latter is investigated using ethnographic methods, i.e., data collected during visits to sites around Japan.

Plotting a course for fashion through the Anthropocene requires an understanding not only of contemporary, technologically novel design practices, but also longstanding traditional forms of making. This chapter will present washi-making as evidence of how the three identified qualities—collaboration, openness, and transparency—are enacted and folded into a community-based material-making practice.

A reframing of longstanding papermaking practices using qualities that are adversarial to the dominant fashion industry can inform new methods for material-making for fashion that are the product of contingent relationships between community and the local landscape. In these new relationships, the consumer is empowered to occupy simultaneous ontological positions, which may be adversarial or challenging to the status quo in fashion: hacker, maker, (consumer-)producer.

3.1 Introduction

Novel consumption schemes have been developed by communities of socially engaged consumers that problematize the hierarchical relationship between the producer and the consumer outlined in chapter 1.

The novel schemes discussed in this chapter can be understood as part of a wider consumer trend called "access-based consumption" (Armstrong et al. 2017), the "on-demand economy," the "fourth industrial revolution" (Schwab 2016), "maker culture" (Anderson 2012), the "third industrial revolution" (Rifkin 2011), and "the sharing economy" (Botsman and Rogers 2010). These are all terms that refer to behaviors and methods that encourage people to circumvent the traditional top-down production system through collaborative methods. According to Mason (2015, 20),

collaborative methods make use of "network technology to produce goods and services that work only when they are free, or shared..." In other words, they rely on peer-to-peer communities of consumers based on relationships of reciprocal trust that are mediated by network technology. An examination of how these sharing and collaborative structures could be useful in developing new methods for fashion design. Manzini (2015, 62) suggests that design can be a tool for social innovation, and that collaboration between designers and groups of users can lead to the development of a more sustainable way of living.

The fashion industry may not be able to change its practices in a way that it can retroactively become ethical and sustainable. Instead, consumer-led, small-scale or grassroots alternative design practices may have the ability to test ideas and new sustainable methods. Fletcher (2015, n.p) notes that steps toward sustainable fashion can be taken at the material and social levels and that "we must not only reduce the amount we buy, but also and importantly engage with the processes and infrastructure of consumption." Catterall (2017, 33) also expresses the need for grassroots-led change in the fashion industry:

> It is becoming apparent that mitigation, a common industry approach to un-sustainability, cannot realistically combat the catastrophic social and environmental consequences of mass-industrialization and the excesses of consumerism. Radical and systemic changes will be needed and can arguably be introduced more effectively from the ground up by multiple independent actors at liberty to utilize guerilla tactics of enquiry and interruption. (2017, 33)

In this context, a personal sewing machine can become a tool for radical action (Busch 2012) as it becomes a piece of technology through which a consumer can

critically engage with materials and fashion through making or remaking clothing. But there have been limits to consumer agency in terms of remaking existing garments: Even with access to the tools to create garments, such as sewing machines, consumers have had little effect on the places and materials of production that animate fashion because of consumers' status as passive actors in the hierarchical structure of the dominant fashion industry.

3.1.1 Community and Political Action: Collaboration, Openness, and Transparency

As explained in chapter 1, three key community-related qualities related to the sharing and collaboration-driven consumer trend will be discussed in this chapter: collaboration, openness, and transparency. These can be understood better by looking at three means of engagement outlined by Fletcher (2015, n.p.) regarding how a more sustainable fashion system can be engendered by designers and consumers who "…think and engage with existing patterns of power, economic logic, and social conditions."

This chapter looks at community-based material making through the lens of technology, and proposes that if Fletcher's "patterns of power" could be answered with open-source technology, "economic logic" with transparency, and "social conditions" with collaboration, then the novel consumption schemes reviewed here suggest that cleaner, more sustainable methods for fashion design can be developed.

A shift from centralized production (distanced from the consumer) and individual ownership, towards peer-to-peer networks (neighbors, friends, individuals meeting online) is occurring as communities take new forms. Openness, sharing, and collaboration can be identified as key qualities related to these shifts in consumption (Schwab 2016; Rifkin 2013; Botsman 2010). Openness is the practice of making visible the methods and processes by which a product is made, allowing others to see how something is made, and even offering the tools needed to do it. Transparency is related to accountability and communication, allowing others to see how you make. Collaboration occurs when the consumer, or groups of consumers and producers are invited to participate in the process of design or making, or when members of peer-to-peer networks work outside the industry—"community" in this sense extends through technology beyond the family unit or geographic region, (other ways that communities can "extend," specifically by including nonhumans, will be discussed in chapter 4).

The dominant fashion industry is based on a hierarchical top-down system of consumption, where the consumer is not invited to engage with materials or sites of production. This removes the agency of consumers but places upon them burdens of responsibility, in terms of the use, repair and disposal of fashion items. This system echoes many political systems, in that decisions are handed down from elected representatives[26].

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[26] Wood (2016) also notes that a participatory form of democracy, rather than representative, would be instrumental in forming a more ethical world. Mirzoeff (2014) echoes Wood by claiming that to "sustain" (as a society) we need a "participatory democracy" (229), and "crowd-sourced collective and horizontal practice" (215). He goes as far as to cite "mirror neurons," which have been shown to be linked to empathy in humans and animals (Gallese 2001), as evidence that there is an ante-political, biological urge within human beings to relate to one another (Gallese 2003 in Mirzoeff

Wood (2016, 5), argues that changes are emerging in the wider design field with the popularization of open source products, and we are moving away from the "representation-based politics of Utilitarian compromise (that is, voting) to one in which decisions can be based on a more local, positive, spontaneous, co-creative and emergent process." How might this change affect material-making processes for fashion design?

3.2 Washi: Japanese Paper

This section will outline the ways that collaboration, openness, and transparency manifest in the practice of making washi, traditional Japanese paper. To provide some context to the current state of washi-making in Japan, a brief outline of its history is necessary.

As this dissertation is in the field of fashion studies, it is necessary to look at washi from the perspective of material-making, textiles and clothing. Washi may not seem like a suitable material for making clothing, but can be strong and durable. It is one of the hundreds of products in Japan that have been made out of paper over the centuries. Since washi is a material that is made in small communities, an examination of washi-making offers information on community-based production—sites where specific technological and social conditions manifest in a material-making practice—that is meaningful in this dissertation.

3.2.1 Basic Definition

2014). A consideration of Mirzoeff and Gallese's insights could engender participatory forms of design and consumption, beyond the notion that consumers can vote with their wallets.

Washi[27] is a nonwoven sheet of interlocking cellulose fibers, held together by a natural binding agent. Washi can be made of linen, *kōzo* (paper mulberry or *Broussonetia Papyrifera*), *mitsumata* (*Edgeworthia Papyrifera* or *Edgeworthia Chrysantha*), and *gampi* (*Wikstroemia Canescens* or *Diplomorpha Sikokiana*). Fibers from the inner bark of the tree are suspended in a large vat of liquid to produce paper that varies from postcard-size, to the size of a Japanese door or window. The liquid in the vat is water mixed with the gooey root of the Sunset Hibiscus (*tororoaoi*), which binds the fibers. The papermaker brings these fibers together by pulling the emulsion through a screen apparatus (*suketa*) made from wood and bamboo, which, once covered in wet fibers and removed from the vat, is moved from left to right, and forward to back—a movement called *nagashizuki*[28] that allows the fibers to tangle together and creates a strong sheet of paper once dried. The coupling of this movement and the length of the fibers (6-10 mm), creates the distinction between Japanese paper (washi) and Western paper (*yōshi*). Typical western paper has a fiber length of between 2-4 mm, and is made by scooping short-fiber wood pulp from a vat with a screen and allowing the water to drain out (a process called *tamezuki*). Each sheet of washi is formed through a negotiational interplay of human movement, fluid dynamics, and intrinsic fiber characteristics.

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[27] The scope of this research is limited to at-home handmade washi production that uses locally grown kōzo, as opposed to large factories where washi is machine-made using imported wood pulp.
[28] This process was developed by Buddhist monks at Kamiya Temple—near present day Kyōto—during the Heian Period (794-1185).

3.2.2 History and Use

Paper and printing have profoundly impacted human culture and civilization across the world. The invention of paper is widely credited to Chinese court official T'sai Lun, who was allegedly inspired by witnessing silk fibers forming a film on the surface of cocoon-soaking vats used in sericulture. However, there are records of papyrus paper that date as far back at 206 BC (Narita 1980). Papermaking began in China, spread to Japan with Buddhism and then moved west, arriving in Western Europe around the 17th century. The climate in Western Europe couldn't support the kōzo trees used in China and Japan, so cotton rags and, later, wood pulp were used instead (Turner 1983).

In Japan, washi has been produced in villages and towns across the archipelago since around 910 CE. In 2018, one of Japan's most respected papermaking towns, Echizen in Fukui Prefecture, will be celebrating the 1,300th year of worship to their resident Shinto goddess of paper, *Kamikawagozen*. Over the past millennium, hundreds of local varieties of washi and local products made from paper were produced as a result of contingent relationships between local landscapes and communities. When Western paper was introduced to Japan in the late 19th century, there were at least 200 varieties of handmade washi across the nation (Katakura 1988). Currently there are around 75 unique varieties of handmade washi being produced in roughly 35 regions throughout Japan (AJHWA 2017). The number of varieties remains high, considering the fact that washi, like many of Japan's longstanding crafts, has fallen out of daily use and is therefore in a state of decline. It is difficult to identify a direct reason for this, as it could be due to a number of factors, including the competitiveness of machine-made Western paper, and the population decline—the twin impediments of a declining birth rate and rapid urbanization—in the rural areas where washi is made. Matanle

and Rausch's (2011, n.p) research shows that the Japan's rural areas are shrinking, and that "entire villages have vanished, even been 'sold' …[t]housands of municipalities have been judged 'non-viable' and merged." In the aftermath of the postwar push for massive economic development and urbanization, the rural areas that supported Japan's craft and even heavy industries have been left empty. To bring people back to these areas, the government as well as independent investors are engaged in rural revitalization initiatives called *machizukuri* or *machiokoshi*. The rural areas in Japan have a large number of empty houses (gov. stats show 13.5 percent in 2013, up from 2.5 percent in 1963) and even schools (gov. stats show 5,943 in January 2017). These slowly emptying regions are trying to bring people back to live, by offering low-cost housing, or to visit, by spending a lot of time and energy on promoting place-making strategies that either promote local industries (factory fairs) or arts and culture (arts festivals) (Boven, Ariga and Worrall 2016). Washi is also tied up in a two-way narrative of local identity and regional specialty: it is a product of the region it is produced (the land, weather, and people form it) while it also produces the region (places like Mino, Echizen and Kurotani become synonymous with a specific type of washi).

Washi has found another kind of value in contemporary Japan, as it is used to express national aesthetic identity and heritage, and has subsequently become tangled in discussions of regionalism and indigenous authenticity. The wider loss of craftspeople and skills in Japan means that the production of craft objects has decreased, but also allows for smaller, yet still sustainable scales of production involving niche makers meeting niche demand using new technology, including the internet and advanced processing machinery.

Due to its long fibers and mat structure, washi is flexible and useful for many applications, but its early use proliferated in Japan for less pragmatic reasons. The symbolic and religious use of washi occupies most of the long history of papermaking in Japan. It was made first by monks and, because it was so rare and valuable, used exclusively for the

copying of sutras as a form of meditation. Later, it was used more widely by the working-class farmers who took up the papermaking trade. Throughout its history, it has been used historically for both sacred and quotidian items, including clothing, called *kamiko* or *shifu* (Katakura 1988; Natsumi 1980; Tsujiai 1966). These paper garments can be seen as expressions of the landscape that made them, and will be discussed in detail in chapter 4.

Since the introduction of American and European papermaking machines in the late 19th century, and spurred by the post-war need for material production and economic growth, the demand for handmade washi has steadily been in decline. A 1901 statistic showed that there were 68,562 households making handmade washi (Kobata 2012) for various uses, and there are written accounts from foreign researchers and industrialists who visited Japan after its long period of isolation that praise the health and innovation of the local papermaking industry[29].

Since the Heian Period (794-1185), papermaking practices were supported by local governments or rulers and provided farming families with a steady income during the winter months. By the 17th century papermaking had become a stable side job for farmers and their families in the winter when they could not farm, and the industry was further strengthened once paper was used for money and official documents. The proliferation of tools and skills during this era made washi—its products, and as a form of at-home labor—accessible to all levels of society.

Sheets of washi can be molded and treated in order to make many various everyday life objects, and these used have come in and out of popularity over the past millennium. Localized uses for washi flourished and vernacular applications developed as a replacement for expensive and rare materials such as leather, silk, and cotton. During the Edo Period

[29] See account from J.J. Rein (1889), and Sir Harry Parkes (1871, available in Schmoller 1980).

(1603-1868), washi had an incredibly variety of uses: doors, windows, crowns and hats, oilcloth, mats for sitting or sleeping, wax-cloth, fake leather pouches, official certificates with watermarks, embossed wallpaper, lighting, raincoats, umbrellas, pillows, stationery boxes, serving trays, bowls, mosquito nets, small dishes, quivers, tea caddies, water receptacles, boxes, luggage and bags, lunch boxes, sandals, furniture, and tobacco pouches, among other things (Omura 1999). During this boom period, selling paper provided an income for full-time papermakers, as well as farmers and middlemen, so it was in their best interest to keep its sources sustainable through responsible stewardship of raw materials and fostering community involvement. The Edo Period ended with the "opening" of Japan to the West in 1868, resulting directly from the gunboat diplomacy of U.S. Commander Perry. This huge change allowed for the importation of European papermaking machines, which threatened some handmade papermaking communities but also created opportunities for faster and more efficient forms of production as well as new products.

Both machine-made and handmade washi are the product of a tight relationship between people and their local landscape. It is traditionally made by a group of people, with tasks related to material processing shared by family or community members. Two things are vital in papermaking: access to abundant local resources, and a strong community. First, water, good soil, and trees for fibers are vital for the practice to thrive. For every one ton of paper produced, 15,000-20,000 tons of water is needed—10 times that of pulp paper (AJHWA 1991, 51). This is why Japanese washi-making towns flourished near fresh mountain rivers or where subterranean water was plentiful. In these places, the path of natural spring water can flow through the washi studio from the mountain, and continue on into the rivers and groundwater polluted only by the plant-based organic matter from the papermaking studio.

Papermakers who work at home are only able to produce within the boundaries of their physical and temporal limitations; in a sustainable relationship of need and supply proportional with the local availability of raw materials: trees, roots, and water. These are available proximate to a papermaking community, and therefore give that community immediate feedback signals, which could potentially include a reduction in freshwater flow due to low rainfall, or limited access to the raw material trees due to over-extraction or bad weather. Papermaking is a co-operative cottage industry comprised of small-scale family-run operations that use local materials, but a sense of stewardship exists because these resources serve the needs of the entire community.

The skills to make specific varieties of paper were not kept secret, and were shared among members of a family or community—but not between regions, as each had its own specialty. Making handmade washi is labor intensive, and its production often required an extended family network or community to work together, sharing skills and tools. The most time-consuming stages of the process are the harvesting and processing of the raw material, which requires support from family or neighbors to produce washi in a timely manner. Even now, these stages require specialized tools that some papermakers do not own and thus borrow them from local co-operatives and larger papermaking companies. Access to tools is especially important for those who wish to take up the business today as Japanese houses are no longer built to have in-home studios, and it can be difficult to find a place to store vats, beaters, boiling pots, as well as access to large amount of clean running water.

All the papermakers I spoke to in the papermaking towns of Echizen, Kurotani, Mino, Ogawamachi, and Tosa use communal facilities to do their fiber processing work. In Shiroishi, however, due to the low number of practicing papermakers, there are no communal facilities and no co-operative associations to support them. Community, openness, and

transparency are key concepts in terms of community-based production, and a study of washi contributes to the understanding of these qualities.

3.3 Consumer Agency

Before exploring the qualities of collaboration, openness, and transparency in detail, the position of the consumer in the dominant fashion industry will be outlined—specifically in terms of the consumers lack of agency in the top-down fashion production system. This will be done in three parts: First, a discussion of consumer agency; second, an exploration of the concept of the black box in the context of sustainable fashion; third, how consumer agency changes, considering the novel sharing- and community-related consumer trends explained in the introduction to this chapter.

This first section, *consumer agency*, will approach the topic from several dimensions. First, the way a lack of agency manifests, due to the distance between the consumer and the producer. This will be followed by a brief look at fashion education to determine a potential cause for this phenomenon. Finally, ways of reclaiming agency through "hacking" will be introduced.

3.3.1 Distance

One aspect that defines the lack of consumer agency is distance between consumer and sites of production. With each mechanical, chemical or digital advancement in technology, the raw materials and sites of production that fashion is contingent upon have become more opaque and moved farther away from consumers' field of access (Niinamaki and Hassi 2011). Technological progress has been a constant driving force for innovation in fashion, from the invention of the Jacquard loom in the 1800s, to digital patternmaking software, which allows for greater production speeds. However, the desire for low cost and relaxed regulations, along with increasing demand for speed and volume has decentralized production, and thus has made it more difficult to trace where and by whom fashion materials

are made (Henninger 2015; Hertzman 2014). While fashion designers may not intentionally limit consumers' access to materials and sites of production, they emphasize marketability, aesthetic style and novelty over whole systems thinking or ecological thinking, and since consumers never question manufacturing processes, they do not feel obligated to divulge them (Beard 2008). Designers use advertising that supports a brand's 'message' to mediate between the consumer and the producer, and the sites of production are, at best, only selectively shown (Yang et al 2017).

In the case of fast fashion brands, factory conditions are not revealed or accessible, which protects the marketing message of the brand and avoids resistance from consumers (Bain 2015; Clarke 2008, 435; Penaloza and Price 1993). Multinationals maximize economies of scale and maintain retail competitiveness by lowering production costs and increasing turnover of new garment styles. Consumers are then faced with the decision to purchase an item based on cost and style, with ethical and environmental implications a secondary consideration (Fletcher 2010; Carrington et al. 2010; Jackson 2005). This distancing of the consumer from the materials and sites of production is a result of the lack of information made available to them, and it limits the agency of consumers to make ethical decisions, and places upon them the burden of ethical responsibility, in terms of the use, repair and disposal of fashion items.

The distance—in terms of knowledge and access—between consumers and the materials and places that generate consumer products grew wider following mass industrialization during the past two centuries, despite the increasing ease with which goods, images and information can travel globally. This relationship of distance took shape in the inter- and postwar periods in North America and Europe, as consumer society accelerated concomitant with growth-focused capitalism. These production and consumption practices are new—they have not always been as omnipresent as they appear to be now. The practices

of consumer society which involve the "ubiquity of disposable objects, the careless use of precious materials, or the harsh labor conditions under which many of our commodities are produced" are only a recent phenomenon of the second half of the 20th century (van Helvert 106, 109).

3.3.2 Consumer Agency and Fashion Education

This section explores the role fashion education plays in the lack of agency of the fashion consumer. The dominant fashion industry, while it does have social and economic benefits, as millions of people are in its employ, is facing criticism from scholars (Fletcher 2015; Henninger 2012; Niinamaki and Hassi 2011), journalists (Bain 2015), and consumers (Fashionrevolution 2016) because of its negative social and environmental impacts, resulting from resource extraction, chemical dyes and surplus production, among other things[30].

While it would require a more thorough study that is outside the purview of this dissertation to determine precisely what role fashion education has in maintaining the status quo of the dominant fashion industry, fashion design pedagogy tends to follows the logic of traditional capitalism. Design schools ask students to imagine themselves in the role of product designer, in a top-down design process, and to create a product offering based on their unique vision of living or dressing. Such pedagogical practices rarely begin with ethical or environmental consideration of raw

[30] There is a great breadth of research on the negative environmental and social effects of the fashion industry in both academic scholarship, and journalism. For an overview, please see: https://www.gcufairfashioncenter.org.

materials or sites of production. Recently however, it has been argued that this individualistic system is out of date (Edelkoort 2017), and alternatives to this top-down (and often offshore, and distanced) production system need to be developed and explored in design schools. Edelkoort (2017) claims there are three goals that such a change should keep in mind: to promote local, small-scale innovation; to re-skill and re-educate the consumer; and to include the consumer in the design and production process.

With sustainable fashion curriculums being developed in many of the top fashion design schools—including the Alternative Fashion Strategies minor at Parsons School of Design, the Material Futures MA at Central Saint Martins, the Center for Codesign (CODE) at the Royal Danish Academy of Fine Arts and the Sustainability in Fashion MA course at ESMOD Berlin—students are in a privileged position to question the existing system and to develop more ethical and environmentally sustainable pathways for fashion design. These students, if trained in sustainability, will go into the industry and have the ability to make positive change. As Palomo-Lovinski and Hahn (2014, 92-3) identify, the inherent sustainability of a fashion item is decided in the design stage, and the designer or creative director in a company is in a position from which they can influence the overall sustainable practices of a brand. Sustainability could become a fundamental practice in the

industry if enough people are interested and knowledgeable about it, which would be promoted by its inclusion in fundamental fashion school curricula.

To be truly successful, however, it is important that fashion studies looks outside its borders and adopts an interdisciplinary approach to develop education pathways to sustainability, and to encourage this as a fundamental practice for every designer. O'rafferty et al. (2012, 169) identify that in order to "mainstream" sustainability in design curriculums, more interdisciplinarity is needed, and that design education "may need to situate itself away from the traditional art or engineering setting…" for the purposes of nurturing relationships with other fields, and aligning itself with grassroots phenomena. Further, by nurturing these relationships, fashion can adopt new methods in order to deal with the new set of social and environmental problems being caused by the dominant fashion industry, to develop new tools and (niche) strategies that are oppositional to the standard practices of the dominant system—i.e., small-scale rather than large-scale (Pasquinelli 2012), collaborative rather than top-down (Sanders and Stappers 2008), or open rather than closed (von Busch 2009 2012). Among these alternative strategies, inclusive methods such as consumer-designer collaboration and co-design have become robust areas of research in recent years, including research from Ballie (2013), von Busch (2012), and Sanders and Stappers (2008).

3.3.3 Hackers

In the first part of this chapter, a shift towards community-based production was outlined that uses collaboration, openness, and transparency. Schwab (2016, 8) has named this shift the "Fourth Industrial Revolution," which he claims is characterized by the "fusion of ... technologies and their interaction across the physical, digital, and biological domains," including artificial intelligence, robotics, machine learning, nanotechnology, biotechnology, quantum computing, blockchains, the Internet of Things, and 3D printing. These new tools and technologies could shrink the distance between products and consumers by granting them access to data and production tools. As network technology develops, it is allowing consumers to develop new tools and to crowbar their way into existing systems to develop their own methods for consumption.

In this context, "hacking" has recently been proposed as a design practice (von Busch 2012, 2009). Hacking can be used as a theoretical point of departure to discuss strategies that circumvent or exploit the flaws in the black box-like fashion system, allowing consumers to reclaim agency. Von Busch (2009, 163) indicates that hacking in fashion design can be a "networked and collaborative … constructive practice rather than subversive," which builds on a "do-it-yourself practice of direct intervention." A so-called hacker in this sense is not necessarily engaging in destructive criminal activity. McKenzie Wark argues in *A Hacker Manifesto* (2004, 3) that hackers "create the possibility of new things entering the world," and that, "[i]n art, in science, in philosophy and culture, in any production of knowledge where data can be gathered, where information can be extracted from it, and where in that information new possibilities for the world produced, there are hackers hacking the new out of the old." Wark's conception of hacking conjures up a vision of liberating data and of using systems in ways their designers never intended: a method for forming alternative worlds, accessing the internal workings of a system, entering a blurry space between producer and

consumer, and reclaiming ownership through resistance to dominant systems of consumption. The dominant fashion industry removes the agency of consumers by limiting their access to the sites and materials of production, but hacking may be a way to understand consumer-led approaches that are giving agency back to consumers.

3.3.4 Fashion, The Black Box

There are many reasons why consumers lack agency in the dominant top-down fashion system. This section aims to identify one of the major reasons that agency of the consumer is limited by introducing the concept of the black box[31], a term that refers to the hidden nature of the mechanisms that animate technologies, borrowed from cybernetics pioneer Ross Ashby, who describes them as such:

> The Problem of the Black Box arose in electrical engineering. The engineer is given a sealed box that has terminals for input...and terminals for output.... He is to deduce what he can of its contents.
>
> Sometimes the problem arose literally, when a secret and sealed bomb-sight became defective and a decision had to be made, without opening the box, whether it was worth returning for repair or whether it should be scrapped.
>
> Though the problem arose in purely electrical form, its range of application is far wider. The clinician studying a patient with brain damage and aphasia may be trying, by means of tests given and speech observed, to deduce something of the mechanisms that are involved.
>
> Black Box theory is, however, even wider in application than these professional studies. The child who tries to open a door has to manipulate the handle (the input) so as to produce the desired movement at the latch (the output); and he

[31] Mathematician and philosopher Norbert Wiener (1961, x) called the black box an "as yet unanalyzed nonlinear system," which is notable in the sense that it presupposed that it can be analyzed and understood.

> has to learn how to control the one by the other without being able to see the internal mechanism that links them. In our daily lives we are confronted at every turn with systems whose internal mechanisms are not fully open to inspection, and which must be treated by the methods appropriate to the Black Box. (Ashby 1956, 86)

The phenomenon of the black box that Ashby describes may be extended to refer to all consumer goods produced using the distance dynamic described in an earlier section—he uses the example of a door, but a garment may also be considered to have its inner workings hidden, to both consumers and producers. As Anusas and Ingold (2012, 58) suggest, the exteriors of consumer products are impenetrable in the metaphorical sense, in that their material origins, their "lines or conduits of energetic and material circulation" are hidden. Fashion products can be considered in the same way. The black box provides an analogy for understanding the role that knowledge and access to sites of production—being able to "penetrate" the exterior of products—can play in developing sustainable fashion design methods.

The dominant fashion industry is a black box that places upon consumers the burden of responsibility, in terms of the use, repair, and disposal of fashion items. A black box is a closed system with only the inputs and outputs visible—the processes in-between are obscured. In a black box-like fashion production system, the perceived inputs are the brand, designer, and materials, and the outputs are the products of the brand. The interior of the black box contains the complicated logistics of the fashion supply chain, which—because of the relationship that the fashion industry has with

the environment—may be detrimental to the trust relationship between a consumer and a brand if they were made clear (Yang et al. 2017, 6). The opaqueness of certain processes in the industry is not limited to the consumer. Due to vertical disintegration in the supply chain, fashion designers themselves may not know where and under what conditions their designs are being produced. Some designers may never see the inner workings of fashion's black box, as designing and manufacturing can take place in many locations, in different cities, countries on continents (Fashionrevolution 2016; Fletcher 2015; Caniato et al. 2012, 659; Braungart and McDonough 2002, 39).

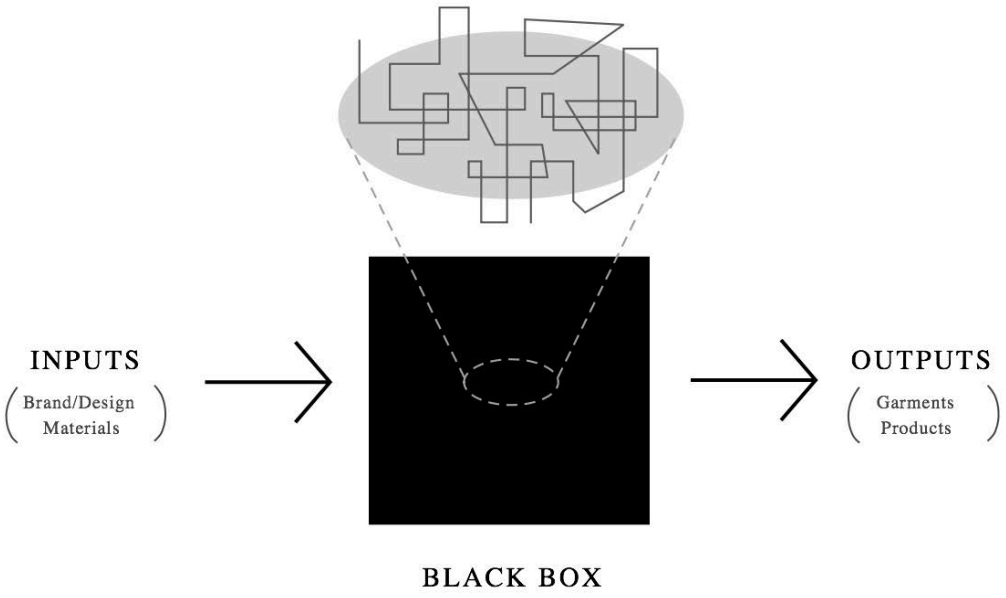

Figure 4 - The black box of fashion.

Van Helvert's (2016,111) observations on planned obsolescence suggest that the contemporary design practice of rendering the inner workings of products

inaccessible for repair is useful for the producer, as it encourages replacement of consumer products. Planned obsolescence is not a problem only in fashion. Many consumer products have been designed to become obsolete or nonfunctional after a short period of time—recently, lawsuits have been filed against Apple in Israel, the United States, and France over allegations of slowing down older phone models, and France outlawed the practice of "deliberately reduc[ing] the lifespan of a product to increase the rate of replacement" (Gartenberg 2017).

The top-down fashion system, when coupled with a complicated supply chain, has created a dynamic in which the consumer knows little about the conditions of production, and may therefore unintentionally participate in unsustainable or exploitative practices. Awareness of this dynamic—especially following the collapse of Bangladeshi garment factory Rana Plaza in 2013, when more than 1,100 garment workers were killed—has resulted in increasing demand for information about the conditions of garment production (Fashionrevolution, 2016). Despite this, potentially unethical labor practices and long-standing ecological negligence remain in practice and largely hidden from the consumer (Zerbo 2016; Young 2013; Beard 2008). Can a more transparent black box be achieved, and can this promote sustainability? In terms of this dissertation, the answer is no. Rather that reacting to an already black-

boxed industry by trying to "hack" it partially open[32]—or to retroactively implement what Catterall (2017, 34) calls "mitigating strategies" in existing unsustainable supply chains—a complete circumvention of the black box is necessary to promote social justice and environmental sustainability in the fashion industry.

Public criticism puts pressure on manufacturers to implement sustainable practices. Sustainability, a word with definitions as diverse as its scales and practices, was first introduced in the Bruntland Report[33] in 1987: "Sustainability means being able to satisfy current needs without compromising the possibility for future generations to satisfy their own needs" (World Commission on Environment and Development 1987). Mittelstaedt et al. (2014) characterize sustainability as a transdisciplinary "megatrend," which "reflects the economic, political, cultural, philosophic and technological milieu of its day." Despite wide-ranging awareness, a clear definition of sustainability has been a struggle to agree upon. Sustainable

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[32] Despite making efforts toward transparency and accountability, producers are likely to keep certain aspects of their business hidden. For example, in an interview with a fashion producer, Young (2013) shows that they will share their locations of production, but not the specific chemicals or methods they use in their denim washes. This is why I use the word "partially" here, in order to show that "hacking" the system may not be enough, and that the "hackers" could have more success by using the parts of the system themselves to create their own systems of production and consumption.

[33] Sustainable fashion research is supported by a complicated web of questions and pathways of inquiry. It deals with the relationship between capitalist production, ideological communitarianism, ecological thinking, and humanistic philosophy. The three "pillars" of sustainability are economic, environmental and social. Sustainability of a system relies on many factors: ethics, the environment, resource management, supply chain, consumption and end use.

practices in the fashion system have also been difficult and slow in implementation, as they require large-scale fundamental reforms to an industry that has successfully used unsustainable manufacturing models for many decades.

The fundamental cause of unsustainability is that both consumers and producers in contemporary society are engaged in a system in which immediate self-interest is placed above the cumulative effects on the environment of the consumption system in which they are a part. Not being able to define what sustainability is, and therefore see the problem, makes it difficult to take steps to address it.

For consumers who have no agency in the production of fashion, the difficulty of choosing products that are ethically produced is compounded by a lack of standardization. Despite the sites of production that shape the fashion industry being spread across the globe, there is no global set of standards[34] for best practices. The lack of global standardization of sustainable fashion production methods means that there is no clear and trustworthy way to inform a consumer about the social and

[34] There are numerous certifications, but no global standard. Please see: https://www.futurelearn.com/courses/sustainable-fashion/0/steps/13562 for a list of almost 20 initiatives, certifications, and schemes. This website is also useful resource: http://www.ethicalfashionforum.com/the-issues/standards-labelling. GOTS (the Global Organic Textile Standard) is the most advanced, and offers certification for organic textile products and garments that use organic textiles, a database of certified producers, and other resources. Please see their website for more information: http://www.global-standard.org/the-standard.html. While they may not offer strict follow-up or certification, consumer-producers can access information about many producers from online databases such as Wikirate (http://wikirate.org).

environmental qualities of sites and materials that animate fashion. The lack of a global set of standards is understandable, as every country has its own regulations, and things like ethical production, social justice, and even environmental damage are relative. The Higg Index, launched in 2012 by the Sustainable Apparel Coalition, is an indicator-based assessment tool and a resource that offers a range of tools for designers and producers that cover the design process from material sourcing to design. Brands can even evaluate their level of environmental sustainability, and make that data publically available to consumers.

Despite this, consumer confusion about ethical fashion persists, as labels don't give consumers enough information about where and under what conditions a garment is made. Henninger's (2012) study of the 15 most common eco-labelling standards within the UK fashion industry illustrates a lack of awareness from consumers or the industry. Henninger (2012, 6027) concluded that "consumers lack knowledge of these labels or find them not instructive," and that "the experts and owner-managers [who participated in the study] believe that none of the current labels in existence cover all their needs." The resulting high number of conflicting eco-labelling bodies and methods (Earley 2012) means that consumers may not understand the implications of a label denoting sustainable practices, and therefore often ignore the label, negating its value (Henninger 2012; Harbaugh et al. 2011). It is not easy for consumers to make ethical purchasing decisions, especially when they are not presented with accurate or adequate information about the product they are considering[35]. The information given to consumers is limited, and use of certification labels could be based on the desire of the producer to display how they align with prevailing societal norms, such

[35] See Yang et al. 2017, for an in-depth literature review on research concerning consumer purchase decision and ethical fashion.

as ethical production, rather than indicating clearly how (and even if) such an alignment has taken place (Charter 1992 in Yang et al. 2017, 7).

3.3.5 Paradox of Sustainable Fashion

Catterall (2017, 32) highlights the paradoxical problem between the contemporary design paradigm and sustainability in that "[d]esigned or stylistic obsolescence remains a central element of most Western industrial, socio-economic systems, and sustainable growth conforms to this expansionist economic model contingent on a value-system that accepts as given accelerated product turnover and excessive waste." Black (2007), highlighting the importance of critically addressing sustainability issues in fashion studies, also notes the paradoxical nature of fashion: the positive economic gains produced versus its inherent potential to create waste and environmental harm. From an economic perspective, environmentally sustainable fashion in the dominant fashion industry is a contradiction.

In his reporting on Swedish fast-fashion producer H&M's recent initiative toward sustainability, Bain (2015) also points out that the despite their desire to make some environmentally beneficial changes to their business and promote sustainability, the core aim of their business model—growth—is the problem. Despite already having over 4,351 stores in 64 markets, they are expanding operations by 10-15 percent each year (H&M 2016, 13). Bain identifies that the problem—along with surplus production and sheer volume—is linked to resource use. He cites a quote from Henrik Lampa, environmental sustainability manager at H&M: "We really want

to do whatever we can to make sure our products have more positive impact and less negative impact both socially and environmentally than any of our competitors ... [y]ou have to work for this, systematically. But then in the long run, the negative impact is really linked to resource use." To address this, mitigating practices such as recycling have become a big part of their effort to "decouple growth from resource use" (H&M 2016, 38).

Catterall's (2017, 33) statement that mitigating strategies are unable to "combat the catastrophic social and environmental consequences of mass-industrialization and the excesses of consumerism" shows that the ability and drive for change may be in the hands of small-scale producers and even consumer-producers. Instead of large companies trying to change existing supply chains, real change can be achieved by smaller groups through consumer-led radical propositions for design and consumption.

Garments engineered to have low environmental impact still require resources and most often leave the responsibility of disposal in the hands of the consumer. The consumer can resist making unethical choices by choosing to not buy new items, yet ontologically a consumer remains a consumer—one who can only assert their agency through resistance or limitations. Not replacing clothing in sync with new seasonal collections allows a consumer to ascribe to the ideals of "slow fashion"—inspired by Carlo Petrini's slow food movement—thereby becoming asynchronous with the fashion system and seeking a longer relationship with garments.

Black (2007), highlighting the importance of critically addressing sustainability issues in fashion studies, notes the paradoxical nature of fashion: the positive economic gains

produced versus its inherent potential to create waste and environmental harm. From an economic perspective, environmentally sustainable fashion in the dominant fashion industry is a contradiction.

Clarke (2008) echoes Black (2007) by calling the slow fashion movement an "oxymoron," in that fashion is typically understood to be fast and obsessed with the new. "Slow" movements envision a lifestyle in which each meal or garment has a longer and more meaningful relationship with the consumer, but it is difficult to measure their effectiveness. Clarke (2008, 428) positions slow fashion as an alternative consumption paradigm to fast fashion, one adopted only to "identify sustainable fashion solutions, based on the repositioning of strategies of design, production, consumption, use, and reuse, which are emerging alongside the global fashion system, and are posing a potential challenge to it." Chapman's (2009) research on emotional durability in design echoes the tenets of slow fashion in that he proposes that consumers can benefit from a deeper and more meaningful relationship with their clothing gained through emotional attachment. He points out that the emotionally "durable" aspects of design need to be assessed in tandem with comparatively robust research on the material and energy considerations of sustainable design. He indicates (2009, 29) that environmental sustainability is "a behavioral issue, and not one simply of technology, production, and volume." He implies that people need to change the way they think about consumer products at a fundamental level. Slow fashion and emotional durability offer perspectives to consumers that may aid them in keeping their clothing longer, mending, and potentially consuming less, but ultimately, they are passive and ineffective strategies for the consumer to reclaim agency in the fashion industry as they do not affect the top-down processes of the fashion industry and have no bearing on the sites and materials of production of fashion.

A growing number of researchers and designers have suggested effective and novel design-led interventions that focus on sustainability—such as Timo Rissanen and Holly McQuillan (2016), Safia Minney (2016), and Kozlowski, Searcy & Bardecki (2016)—but there is little research on how a consumer can effectively engage with sustainable practices beyond leveraging their purchasing power (Black 2007, 2012; Carrington et al. 2010).

Research into design and production practices which engage with or otherwise promote the agency of consumers is currently needed as patterns of consumption are changing, and consumers are forging new pathways out of the old ones. Researchers Botsman and Rogers (2010), Rifkin (2011), and Anderson (2012) characterize this shift in consumer patterns as a product of our network culture and argue that it is an indication of a third phase of industrialization that problematizes producer/consumer hierarchies.

Even if large producers in the dominant fashion industry implement sustainable practices, they still produce garments inside the black box of the industry, and consumers' only access to the sites is mediated by the producer, and limited to the information on the garment label or online. Therefore, consumers are not empowered to make ethical choices, and are still left without agency in the dominant fashion industry. However, consumers are taking back agency by developing consumer-led design and production schemes that circumvent the top-down fashion production hierarchy.

3.4 Consumer Agency in the Sharing Economy

This section connects the concepts outlined in the previous two sections—consumer agency and the black box—to developments in the sharing economy that empower consumers. First, the sharing economy—a cover-all term used to describe novel consumption schemes that problematize the roles of producer and consumer, and which are predicated on

community and sharing—will be examined in terms of its potential to activate consumers, as well as the dangers it poses to those same consumers for exploitation from large corporations.

3.4.1 The Sharing Economy

Criticisms of the fashion industry are numerous and concomitant with changing patterns of consumption, specifically questions stemming from the socially and environmental effects of capitalism. Mason (2015), Anderson (2012), Rifkin (2011), and Botsman and Rogers (2010) are among the many researchers predicting the end of the late capitalist consumption model and are investigating what they view as an alternative: the sharing economy, also called "collaborative consumption" or the "third industrial revolution[36]."

The "third industrial revolution" is defined as an age of small-scale production, access to tools, mass customization, information technology, artificial intelligence, decentralization, and sharing (Martin 2016; Anderson 2012; Rifkin 2011; Botsman and Rogers 2010). The "sharing economy" is one consumer trend that has emerged from it. According to Botsman and Rogers (2010), the sharing economy can be characterized as a shift from private ownership to networks of extended community-based access. Members of these networks take on the role of producer, middleman, and designer, and they seek openness in systems, tools and knowledge that they share

[36] For a more complete list of, and analysis on the discourse surrounding these terms, see Martin 2016.

with one another (physically and digitally): they barter, trade and lend. These sharing behaviors are not part of the modus operandi of the dominant fashion industry, which promotes exclusivity, obsolescence and private ownership of goods. Some areas of the sharing economy are free, involving bartering and new forms of non-monetary currency like time banks. Martin (2016, 153) identifies consumers who partake in monetized areas of the sharing economy as seeking "economic opportunity," "a more sustainable form of consumption," and "a pathway to a decentralized, equitable, and sustainable economy."

The specific propositions introduced in the following sections, including those insights gleaned from an examination of washi-making practices that relate to collaboration, openness and transparency have yet to be thoroughly tested in the context of fashion. This liminal stage of fashion sustainability provides as opportunity for fashion designers: There still remains a widely uncharted region of learning and experimentation in which questions and challenges can be put forward to the hierarchical strata of the dominant fashion industry, and to the ontological positions of producer and consumer.

Sharing is being promoted as "a disruptive innovation that could transform market economies" (Martin 2016, 149), which could offer insights into the development of new methods of production and consumption of fashion. Von Hippel (2016, 1) highlights the importance for producers to develop new pathways for

production that involve consumers, which he describes as "free innovators." According to his definition, these are people who make physical or digital artefacts in their discretionary time and release them for no financial gain: "free innovation involves innovations developed and given away by consumers as a 'free good,' with resulting improvements in social welfare."

However, a destabilization of longstanding hierarchies, while providing a fertile ground for redefining categories for the sake of social justice, can simultaneously open cracks that can be exploited. As Martin (2016) shows, the shift toward consumer agency in the sharing economy is not wholly positive: new forms of sharing could lead to exploitation in the form of unpaid labor and could commercialize aspects of life previously out of reach of capitalism (Morozov 2013 in Martin 2016, 149). Martin (2016, 153) further shows that the sharing economy has been criticized for "creating unregulated marketplaces…reinforcing the neoliberal paradigm," and being "an incoherent field of innovation." Tom Slee, author of *What's Yours is Mine* (2016)—responding to sharing economy advocates Botsman and Rogers, who authored *What's Mine is Yours* (2010)—criticizes the rhetoric of sharing economy proponents in Silicon Valley, arguing that "[n]ew businesses may be built around sharing and openness, but commercial instincts will tend to drive out altruistic behavior, and the generous impulses that inspired the Sharing Economy will be crushed by monetary incentives" (2016, 16). Slee sees these forms of market

exchange not as the end of employment—as Sundararajan (2016) has claimed—but as potential sites of new forms of worker exploitation (Millard 2016). Tech giants such as Airbnb and Uber have grown to gargantuan proportions by profiting from problematic areas of traditional capitalism that are also prevalent in the dominant fashion industry: outsourcing of labor to an unregulated workforce (Hertzman 2014) of non-unionized and unprotected freelancers (Slee 2017), and an unchecked desire for growth. The sharing economy is a system of relations and monetary exchange where consumers may be simultaneously empowered to circumvent some of the larger systems of production and exchange, and yet also leaves them vulnerable to exploitation from large firms. Sharing economy tactics have yet to widely be applied to fashion, but some doubt has been cast on their efficacy in lessening the environmental impact of the garment industry.

The environmental impact of sharing as an alternative to traditional consumption schemes in the fashion industry is not immediately clear. Sharing is positioned by Joyner Armstrong and Park (2017) as an alternative for consumers who do not wish to purchase new clothing, but the authors question the efficacy of such actions on the deleterious effects of fashion: "... current digital collaborative apparel platforms like Listia (swapping), Bag Borrow or Steal (renting), Rent the Runway (renting), or Tradesy (resale) raises suspicion that a meaningful contraction in the overall pace and scale of apparel production or consumption may not be entirely

realized." In other words, the negative environmental impact of garment production from the dominant fashion industry may not be alleviated by the sharing, borrowing or rental of clothing, due to the simple fact that this dynamic still necessitates the production of new clothing.

Though sharing, borrowing or rental of garments may not yet be an effective overall alternative to the dominant fashion industry, there are three concepts that have emerged from the sharing economy that are defining new approaches to consumption and production: collaboration, openness, transparency. They have yet to be tested widely in fashion design, but they can be seen being tested in small-to-medium sized enterprises and other small-scale projects outside the fashion industry, and especially startups who are developing new pathways to circumvent the black box of mass-production.

3.4.2 Small Scale

Both Anderson (2012) and Fletcher (2007 in Chapman 2009, 29) make the case for the effectiveness of small-scale enterprises in affecting the development of alternatives to conventional processes of production and consumption—for consumer agency, or for sustainability. Fletcher illustrates that a pluralistic approach to environmental sustainability is needed, in that "we are not looking for mass answers, but instead, a mass of answers."

Small-scale and grassroots practices are the subject of this study, but how small is small? In some cases, it may involve only an individual maker, creating objects from local materials for themselves and their community. According to the European Commission (2017), a small-to-medium-sized enterprise (SME) can be one of three sizes: Small, medium, and micro. A medium-sized enterprise has less than 250 employees, a turnover of less than €50 million and a balance sheet of €43 million; a small one has less than 50 employees, and both a turnover and balance sheet of less than €10 million; and finally, a micro-sized enterprise has less than 10 employees, and both a turnover and balance sheet of less than €2 million Euros (European Commision 2018).

Japan is a robust source of data on small enterprises. The Japanese government categorizes SMEs depending on industry, but the largest SME is 300 employees with a turnover of ¥300 million (NATPSME 2017, viii). The Japanese government reports that the number of SMEs in Japan continues to grow, after a slight decline in 2016 following the Kumamoto Earthquake. Overall, the report shows that SMEs are more resilient than larger firms in terms of market downturn, and have the flexibility to implement new IT strategies to promote sales (NATPSME 2017, 6). A *machikōba*—a small factory, sometimes no bigger than a house—is a common sight in, even in Tokyo. These small and flexible factories contribute to a broad range of industries—automotive, food and beverage, and fashion—and have a strong impact on the economy. Data from 2014 shows around 12,000 machikōba employed 269,815 people

in Tokyo alone, with the majority of companies having less than 10 employees (6,650 companies in 2014) (Statistics Tokyo 2017).

Figure 5 - Echizen. A family-run machikōba that makes paper.

A study of small-scale material cultures that are contingent on social systems involving local actors—such as communities in Japan like papermakers—may contribute to the development of environmentally sustainable fashion design methods. Fletcher (2014, 167) illustrates this: "... few ideas are more ecologically powerful than those linked to designing and developing products to sustain communities, providing people with meaningful work and a sense of connection with the place and the people with whom they live." But, following Stengers (2010) and Haraway (2007), local

communities—typically thought of as involving human participants in small-scale material culture—may be usefully expanded to include nonhuman organisms. The value of expanding the borders around who is consider a "local actor" is that notions of terroir—the landscape imbued in a material—can be developed for fashion materials, and that it could promote a sense of responsibility to one's local bioregion.

But perspectives that promote nonhuman inclusive ecological thinking in fashion are almost nonexistent, and even less inclusive sustainable alternatives are criticized for being too few to have importance or efficacy. Beard (2008) points to the small size of the "ethical" fashion industry as having impeded it from competing with larger-scale businesses. Palomo-Lovinski and Hahn (2014) parallel Beard by pointing out that the current awareness of sustainable design practices among fashion designers is limited in concept and method, and has not enabled an economically sustainable alternative to large-scale manufacturing. While this may be the case, some argue that the small scale of these practices and businesses is giving them power to be more flexible and take risks that larger operations may not be able to.

Chris Anderson, author of *The Long Tail* (2006), claims that the internet has enabled a culture of digitally connected local "makers": fleets of small niche brands that are directly connected to consumers online and may collectively claim more economic power than the bigger brands. Smaller-scale companies have another benefit, related to the overarching purpose of this study: the capability of producing a

vernacular and idiosyncratic material culture that would be impossible in larger companies with strict standardization protocols and a focus on growth. Although one small-scale company may not have the economic power to compete directly with a larger manufacturer, it may able to stimulate adversarial narratives and promote alternative ways of making with nonhuman actors in local communities.

The underwriting of Anderson's (2006) thesis regarding our ability to connect niche makers with consumers is found in Economist and activist E. F. Schumacher's (1973) *Small is Beautiful*. This text is a manifesto for "enoughness," in which Schumacher identifies small-scale local practices of resource use as an alternative to the capitalist structures that depend on large-scale extractive resource use to flourish. These are the same structures which dominate in current fashion industry practices, in terms of material use, sites of production and product disposal. Schumacher calls for "appropriate" production technologies that are opposed to largeness, uniformity, standardization, and production efficiency. Appropriate technologies (AT) are systems of production that are embedded within local communities that can immediately see the results of resource extraction, since this processing traditionally happens within geographic proximity, close at hand and visible, to the community itself. Such a claim echoes the capabilities and flexibility of small-scale operations, in that technologies are not one-size-fits-all, and demand localization.

With small scale also comes the concept of proportionality in the sense that production can only scale to the size of supply of locally-available resources and labor. And, because the technologies respond to locally-accessible resources, overextraction and neglect will show in time for people to respond to. Responding the negative environmental impact of large-scale production, Schumacher (1973) stresses the need for products that embody vernacularity, community, and follow seasonal rhythms related to the air, water, people, and landscape of a specific place. The resulting products would be made on a small-scale by makers who are working with local materials to meet the demands of a niche market. The handmade papermakers in Japan are one example of this, but there are examples in many other locales across the archipelago, including fishermen in Gifu, pearl divers (*ama*) in Wakayama, carpenters in Ise, hot spring proprietors in Kusatsu, and silk weavers in Kyōto.

3.5 Sites

The aim of this chapter is to build knowledge that can contribute to the development of a framework for interspecies design by looking at the longstanding material-making culture of washi through the lens of the contemporary issue of consumer-led production. Traditional washi-making practices will be reframed using the qualities of collaboration, openness, and transparency in the next sections. By reframing these longstanding practices using new perspectives and theories, we can forge pathways to new methods for material making for fashion that are sensitive to relationships between community and the local landscape.

Before beginning the analysis of the qualities identified in the previous sections, this section will provide an overview of the site visits to papermaking communities in Japan.

Six sites were visited over the course of two years, between May 2016 and April 2017. The data acquired during these visits came from participant observation and interviews with community members. These six communities, connected to six distinct geographic regions in Japan, were selected as they are historically important papermaking towns that have communal working facilities and active co-operative associations—each offered the opportunity to explore the concepts of collaboration, openness and transparency in situ. The towns in the study were (in order of visitation): Echizen (Fukui Prefecture), Mino (Gifu Prefecture), Kurotani (Kyōto

Prefecture), Ogawamachi (Saitama Prefecture), Tosa (Kōchi Prefecture), and Shiroishi (Miyagi Prefecture). Please see the map on page x highlighting the different areas visited in the study.

3.5.1 Site Selection Criteria

The six towns listed above have unique papermaking histories. These sites were selected after literature was reviewed to determine regions that have public and communal facilities for washi makers. The site selection began with Kurotani[37], and the selection of the remainder of the sites was based on literature review and information regarding my research questions gathered via interviews at each site.

In Turner (1983), I found that Kurotani—in Kyōto Prefecture—has a long history of tool-sharing and communal material-making practices that include at-home family-based production and neighborly collaboration. The text also indicated that because Kurotani was in the southern part of Japan, raw materials were easy to source, locally growing, or easy to propagate.

Kurotani was selected as the first site, based on Turner's (1983) report and more recent information (KWKK 2017) that indicated the region had a co-op that still supported the local papermakers. Other sites were selected after visiting Kurotani, as individuals from the community there, as well as members of the Society for the

[37] Due to scheduling convenience Echizen was visited first, but the first place I identified as significant to this dissertation was Kurotani.

Study of Washi Culture of which I am a member shared information about other parts of the country that had their own robust industries supported by community activity. This ad-hoc method of face-to-face information gathering proved essential, as accurate information about small-scale papermaking operations—especially those that are community based—is hard to come by: Information is not readily available online, in journals or books, or over the phone.

I will detail the realities of this ad-hoc method for site selection here: As Kurotani has a small-scale papermaking industry—only nine papermakers were actively working when I visited in October 2016—it became evident that some larger communities would also be important to visit. Key takeaways from Kurotani which are related to the concept of consumer agency identified in this chapter were: the value of support from the government or administrative body in terms of public facilities for future generations of papermakers, the appearance of communal or public workspaces, the development of a training system for new papermakers, the spread of at-home working facilities, the importance of cultivating raw materials locally, and communal buying practices. Though these key issues emerged from the visit to Kurotani, not all of these were currently part of the community itself, so, based on information gathered there, I chose two subsequent sites in which to continue the study: Mino, Gifu Prefecture, and Echizen in Fukui Prefecture.

In 2014, washi-making practices Mino was selected for UNESCO intangible cultural heritage status (UNESCO 2017), granting it recognition as it a culturally significant and, more importantly, active papermaking region. Echizen was the first place where money was produced in Japan, and, like the other sites, has a robust washi-making industry today. Through interviews in Kurotani, Mino and Echizen, I learned that Tosa, in Kōchi Prefecture, was said to have a thriving community of papermakers and communal working facilities, as well as cultivating its own kōzo and training programs for people who wish to take up the trade. The final site, Shiroishi in Miyagi Prefecture, was selected for its storied history of making paper textiles and garments. It is well-known as the only place left in Japan that still makes clothing from sheets of handmade paper. Poet[38] Matsuo Basho stopped here in 1689 to purchase kamiko during his long walking tour, which is subject of his book *The Narrow Road to the Interior*. A handful of haiku poems in that book are about the paper garments he owned:

> Heat waves shimmer
> off the shoulder of my
> paper robe
>
> (Saito 2007, n.p.)

[38] Many poets wrote haiku about kamiko. By the 19th century, it became fashionable for poets to wear simple paper outerwear, especially those that were covered in handwritten poems. Perhaps this trend was part of an appreciation paper's association with roughness and humility, or the rustling sound it made as a wearer moved (Leitner 2007, 19).

What I found in Shiroishi was surprising: I thought I would find a region with a thriving industry of paper clothing, or at least of papermaking, but instead found that the last papermaker had recently retired at 92. Furthermore, the paper clothing made in Shiroishi since the postwar period had not been made to be worn. My experience here gave me a chance to question my aims in looking for cues about developing sustainable methods through traditional craft or so-called indigenous knowledge. Shiroishi, though perhaps the poorest in terms of resources for this study, proved to be the most useful site for critically reflecting on the limits of small-scale enterprise—for this reason, it became one of the primary sites in this research as is explored in detail in chapter 4.

3.6 Findings from Site Visits

In the following sections, the field notes and data gathered from interviews from the sites listed above will be used to analyze the efficacy of the three previously identified community-related qualities connected to the new community-based consumer trends: collaboration, openness and transparency. Papermaking will be used in order to gain a deeper understanding of the qualities and their potential for application in alternative fashion design strategies.

Ethnographic methods, specifically semi-structured interviews[39] and participant observation with community organizers, papermakers, and other locals were used to gather information during site visits. This was not a comparative study of each of the papermaking regions. Instead, the findings are used to clarify and elucidate the core concepts of the thesis about consumer agency and interspecies collaborative methods. Relevant information from participant observation of papermaking will be shared in the text when appropriate.

The subsequent sections of this chapter are separated into three categories: collaboration, openness and transparency. Each quality will be examined through a review of the ways it manifests in contemporary art and design practices, and an exploration of its manifestation in traditional Japanese papermaking at five of the six sites visited[40].

The wider goal of analyzing these qualities through the living tradition of papermaking—perhaps even a reframing of longstanding papermaking practices—is to respond to the overall purpose of this study: how might qualities that are adversarial to the dominant fashion industry inform new methods for material making in fashion that are the product of contingent relationships between community and

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[39] A complete transcript of every interview can be found in Volume 2. Some real names are withheld, but some who are artists and important community members appear in the text with their full names. More information on this can be found in the "Note on Style" section in the introduction to Volume 2.

[40] Six sites were visited in total, but the final site, Shiroishi, Miyagi Prefecture, will be omitted from this chapter and will instead from the basis for the discussion in chapter 4.

the local landscape? Following earlier discussions of the ontological position of the consumer, such an analysis provides real world examples of how a consumer might occupy multiple ontological positions simultaneously: those of hacker, maker, (consumer-)producer.

3.6.1 Collaboration

In opposition to the top-down, hierarchical process of product design outlined in chapter 1, more inclusive paradigms of product design exist that embody an almost utopian ideology. Such collaborative creative strategies, where parties work together to produce something, have been highlighted as an important area of recent design research (Ballie 2012; von Busch 2010; Sanders and Stappers 2008), and are one way of distributing agency between the designer/producer and the consumer. For example, Ballie (2012, 17-20) argues that social consumers can be empowered to up-skill using social media, and cites do-it-yourself, and repair-it-yourself practices as ways of moving from "passive subjects within the fast fashion system, towards becoming co-designer."

Sanders and Stappers (2008, 5) note that since the 1950s, designers have increasingly communicated and worked closer with the users of their products, under the rubric of "participatory design." The researchers (2008, 5) identify two distinct methods of including consumers in the design process: user as subject, and user as

partner. The first, popular in the United States, is "user as subject," in which data is gathered from the user in order to ameliorate the product in a form of applied ethnography based on the needs of the user or consumer. The second, used widely in Northern Europe and pioneered in the 1970s, is identified by Sanders and Stappers (2008, 5) as "user as partner," in which the consumer/user is invited to participate in the design or research process. The latter definition of consumer inclusivity in the design process is most relevant to this dissertation, as it outlines a design research method informed by the situated practice of the consumer—in Northern Europe at the time of the study done by Sanders and Stappers (2008), workers were engaged in the design of new factory manufacturing systems in which "the expertise of the systems designers/researchers and the situated expertise of the people whose work was to be impacted by the change" (Bødker 1996 in Sanders and Stappers 2008). The people affected by the changes were invited to participate in designing the systems that would affect them directly. In the fashion industry, however, consumer inclusion that attempts to emulate the previous example may not effectively address the complex issues of the industry in terms of production, waste, and labor issues. The first method described by Sanders and Stappers—"user as subject"—is most common in the fashion industry, and provides producers with information on their customers' wants and needs, and reduces risk of unsold leftover stock. This form of bottom-up

co-design, driven by consumer research, maintains the consumers' ontological position as passive actors.

Collaborative methods have been applied to design practice at varying scales, but in operating at multiple levels, from amateur individuals to large-scale corporate entities, unique communities must be considered—both human and nonhuman. Ezio Manzini (2015, 90), who emphasizes the importance of social dimensions of design, states that collaborative organizations and relationships are "living organisms that require a favorable environment…" and that they "call for an ecosystem of cultural and social structures, ranging from technical infrastructure to national institutions and neighborhood associations; from global products and production-consumption systems to local ones." Manzini's notion of social ecology could become a fundamental consideration of design practices in fashion and elsewhere. In addition to considering fundamental design principles—color, shape, line, proportion, etc.—designers would benefit from also considering the ecological and social impacts of their design proposals. Some consumers and producers are already addressing these additional vectors and this has opened up new possibilities—for activism, theory and design as a profession (Jevbratt 2017; Fletcher 2016; 2014, 2012; Sawyer, 2015).

While the terms and definitions used to describe acts of designer-consumer collaboration are many, and can be vague, Sanders and Stappers (2008, 6) position the act of "co-design" within the purview of the more general term "co-creation,"

which they define as "any act of collective creativity, i.e., creativity that is shared by two or more people." Such collective acts of creativity may be performed by professional designers working together, but may also include people who are not formally trained as designers. Working together, a team can collaborate for some or all of the design creation process. Von Hippel (2004, 2) points out that co-design and collaborative acts of creation—in which both firms and users openly innovate for themselves—are contributing to the development of a contemporary commons based on open-source methods. Von Hippel echoes Sanders and Stappers' "user as subject" process, by observing that the "user," or consumer, traditionally takes a passive role in the design process. But changes are occurring:

> The user-centered innovation process…is in sharp contrast to the traditional model, in which products and services are developed by manufacturers in a closed way, the manufacturers using patents, copyrights, and other protections to prevent imitators from free riding on their innovation investments. In this traditional model, a user's only role is to have needs, which manufacturers then identify and fill by designing and producing new products. The manufacturer-centric model does fit some fields and conditions...the contribution of users is growing steadily larger as a result of continuing advances in computer and communications capabilities. (2005, 2)

This indicates that the internet is enabling new forms of communication and user (consumer)-led design practices. Wood (2016, 5) echoes von Hippel's view that the internet is enabling the development of novel design methods. It is allowing people to meet their "virtual neighbors," and find like-minded people online, but what relevance does this have to fashion?

Collaboration and sharing may not seem suitable techniques for the design and consumption of fashion, but some new ventures are testing this assumption. These design projects and strategies bridge the social and technical, and have been referred to as "crowdsourced design," "co-design," and "collaborative design" (von Busch 2012). Fashion-specific crowdsourcing platforms that mimic Kickstarter or Gofundme, for example, are being developed where orders are placed for an item before it is produced. These give the consumer input in the design of the product, and save the producer the risk of producing a line before selling it. Some larger brands like Timberland have developed new products using an online platform similar to Kickstarter called Betabrand, which is a site that allows consumers to co-design ad pre-order products and then purchase them on the site, and only products that reach a set minimum are produced. This method of designing offers some interesting possibilities for the production of what Chapman (2009) refers to as "emotional durability" in design—meaning objects that are designed to promote a sense of emotional attachment between the user and object, so that they stay with the user longer, and are not replaced as quickly as other conventional design objects. Fletcher (2015a) follows Chapman, saying that along with material sustainability, research on durable and longer-lasting materials for fashion, new behaviors and consumption patterns must also be developed and promoted. Chapman's thesis that emotional connection can lead to more sustainable consumption does offer some insight into

possibilities for novel relationships with consumer objects, but the act of co-design may not be enough to provide substantial results towards distribution of agency in production, or environmental sustainability in fashion design. In the manner described above—where a consumer has input into the cut and styling of a garment—a consumer still enables the hierarchical structure that enables the sites and materials of fashion to stay in the black box. These co-design strategies seem to prioritize the benefit to the producer, by lessening their financial risk.

A slightly more integrated manner of consumption is happening between consumers in the sharing economy, in horizontal peer-to-peer networks, which involves access to garments rather than purchase, in line with what Botsman and Rogers (2010) have identified as a shift from "ownership to access."

Rent the Runway, a successful online clothing-rental business that has been valued at $100 million (O'connor 2016), attempts to normalize the renting of everyday articles of clothing—much like one would rent a tuxedo or formalwear for a special event. Rent the Runway gives access to a range of clothing, including prohibitively expensive high-end designer pieces, and allows consumers to keep up with changing styles without a large financial investment. This practice is gaining steam, but not all rental-wear companies are as high-end as Rent the Runway; at the other end of the spectrum are brick-and-mortar clothing libraries appearing in cities around the world (Esculapio 2015). In Amsterdam, vintage clothing-lending library

Lena sells monthly "library cards" which can be exchanged for shared items. Though schemes such as these promote sharing—which is oppositional to the dominant system of fashion consumption—they do not promote consumer re-skilling, or access to knowledge of sites of production. Nor do they give consumers the ability to affect the production of materials or garments themselves. In these examples, "agency" refers to the increased ability to access and wear garments, which is a form of democratization, though it doesn't allow consumers agency to change unsustainable or unethical practices in fashion. Conceptual frameworks which address knowledge of the deeper issues raised by the sharing economy need to be considered in fashion practice, in order to form real strategies for collaborative consumption and extend the notion of collaboration to include nonhuman actors.

The contemporary methods of co-design and collaborative design tend to favor the primacy of the producers rather than the consumer, and further emphasize their longstanding dialectic—unless those doing the co-design or collaboration are "free innovators" (von Hippel 2005) independent from producers. In the next section, collaboration will be discussed in the context of Japanese papermaking (in terms of community involvement in the process) and community-organized groups and public facilities, in order to gain a deeper understanding of the phenomenon of collaboration and how it manifests in a material culture.

3.6.2 Paper Co-ops

Collaboration is at the core of papermaking practice. Although single sheets of washi are pulled through a screen by individual, traditional handmade papermaking in Japan is a shared and collaborative community activity that requires a sophisticated collaborative system. This section will introduce the role and activities of the Japan's washi-making co-ops, called *tesukiwashi kyōdō kumiai* (手漉き和紙協同組合, Literally "handmade paper co-operative associations," which will be shortened to "*kumiai*" within this text, to reflect colloquial usage in Japan).

Kumiai in the towns I visited (with the exception of Shiroishi and Tosa, which don't have one) were formed either during the introduction of Western papermaking machines at the turn of the 20th century, or after World War II, to reorganize labor, manage customers' orders, and maintain a living wage for papermakers by splitting up the orders among them.

Handmade paper is a traditional Japanese craft product that—like many traditional handmade craft products—is in a state of decline. According to a report published by Mitsubishi Research and Consulting in 2016, between 2005 and 2015 the number of washi makers decreased by 40 percent in Japan (MRC 2016). The report cites two main reasons for this: First, changing lifestyles are creating less demand for the products that would typically be made of washi—demand has decreased for calligraphy paper, Japanese-style homes with paper doors, and windows

and light fixtures; second, between 2005 and 2015 the price of washi dropped by 50 percent. Certain products are slowly being replaced by cheaper, mass-produced materials that serve the same function—writing, for example is now almost exclusively done on machine-made pulp paper in Japan. As a reaction to this, many papermaking regions took action around the end of World War II, and again in the 1950s and '60s by forming kumiai to organize the remaining workshops. Additionally, during the postwar period the Japanese government promoted the mechanization of SMEs who made handmade paper, leading to the oversaturation of mechanized papermaking, and a deskilling of the labor force for handmade paper. Despite the efforts of kumiai across the country, in response to decline in demand and increase in competition from mechanized production, the production of handmade papermaking experienced a plateau in the 1950s and '60s, and then took a severe downturn in the 1970s from which it has not recovered. The kumiai were formed in response to these changes in order to protect the livelihoods of the remaining papermakers in regions with long histories of papermaking.

Figure 6 - Kurotani. The kumiai in Kurotani looks like a family house. The office is on the first floor, and the second floor is a one-room gallery and museum. The small annex to the right of the building is a shop that sells seeds, snacks and other sundries for the neighborhood.

The kumiai's role in the papermaking community of each town I visited was different, but they occupy an integral position as community organizers to bring together the local papermakers. In Tosa, a town in Kōchi on the southern edge of a group of islands in Japan's inland sea, the office of the local kumiai is located in the paper research facility, which is run by the prefectural government, and open to any papermaking company or individual who wishes to use the facilities to test their products. They also have communal facilities on the grounds—vats, steaming machines, beaters, and other tools that are expensive or difficult to source—that can be rented for around ¥500 per day. In Kurotani, the kumiai is run entirely by the community, with an elected head, but in other areas, such as in Echizen, kumiai are

run as a separate organization and financially supported by the prefectural government.

Some typical kumiai activities include: buying and distributing raw materials among the papermakers, maintaining the communal work facility, working as middleman between papermakers and clients, promoting and selling paper made in their town. In some cases, the kumiai buys the raw materials for all the papermakers in the area, thus ensuring that the farmers will have enough business and that the papermakers receive their necessary materials. In other cases, the association is also involved in sales and distribution, meaning that each papermaker is not responsible for dealing with customers—the association acts as a middleman and distributes work among them. This eliminates competition between papermakers, and allows for a reasonable amount of work to go to each individual or household. While paper was historically made by distributing the labor among members of a family in a household, many papermakers now work alone and therefore don't have the time to complete the laborious process of preparing the raw materials.

Figure 7 - Tosa. The Prefectural Testing Center in Tosa. This is a research facility that houses a public papermaking facility for handmade and machine made paper, as well as the office for the kumiai.

Figure 8 - Tosa. In the Testing Center, facilities can be rented for ¥500 per day.

While all papermaking communities had used imported raw materials at one time or another, I found that papermakers in Kurotani, Ogawamachi, and Shiroishi

were growing their own paper fibers with the help of volunteers and their papermaking community. It's not easy to grow the raw materials, however, and without the help of a community or an extended community of volunteers, the labor cost would simply be too high. Collaboration is imperative in papermaking communities, not only in terms of pure labor, but in terms of co-operation. The papermakers who join their local kumiai enter into an agreement to support one another, to share the work in preparing raw materials, and even to share the economic return—the orders from customers—when needed.

In Ogawamachi, I had the opportunity to participate in a collaborative process that is essential to the papermaking practice. Every January, American-born washi artist Richard Flavin holds a "bark-off" party, where volunteers come to his countryside studio in Ogose, near Ogawamachi, Saitama Prefecture, to help him remove the outer bark from his kōzo trees. Around 2002, Flavin began growing these trees on a disused mulberry field located near the train tracks stretching from Ogose station. He planted 100 bulbs, and now has 600-700 trees, and tends to them with a group of local volunteers called the Satoyama Club, which has around 30 members who are both local and non-local. The land is borrowed from the leader of the club, and before he planted his field, there was no kōzo being grown in the area that Flavin knew of—and the other five papermakers in Ogawamachi depended on imported kōzo from Tosa, Paraguay, or Thailand. Kōzo trees are rhizomes, so they grow quickly

if left untended. The club members tend to his trees all summer, weeding and clipping smaller, weaker branches.

Figure 9 - Ogawamachi. The steamed and heated branches, ready to be peeled.

Figure 10 - Ogawamachi. Richard Flavin's annual "bark-off" party 2017.

In early January, when the branches are around one meter in length, volunteers cut them and bring them to the public facility in Ogawamachi City to steam them to loosen the bark. Once this process is complete, Flavin brings them home, heats them up again, and begins the "bark-off" party. Each year, with the help of volunteers, he is able to produce enough raw materials to last him a whole year, and some years he even has some materials left over. Flavin, now in his mid-70s, would not be able to produce his paper on his own, he needs this extended community to be able to make Ogawamachi paper[41].

Collaboration manifests in different ways in contemporary and traditional practices. In the contemporary sense, it refers to consumers who are engaging with the tools and materials of production by participating in co-design. By doing so, the consumers are reclaiming agency in the production of fashion, and directing their energy towards the producer. But this dynamic still keeps them entrenched in the hierarchical structure of producer over consumer—a vertical dynamic. Papermaking is an example of horizontal collaboration, between users or consumers, and shows that with access to the sites of production and the raw materials, consumers can work together to produce materials.

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[41] Ogawamachi, along with Mino, is a papermaking site that was awarded intangible cultural heritage status (UNESCO 2017). Its paper is called *hosokawashi*, and this region's handmade papermaking industry used to supply the Tokyo market, and was the site where "paper bombs" were produced during WWII, intended to be floated over to the United States with the intention of starting wildfires.

This dual approach was used to gain an insight into situated practices and how the definition of collaboration can empower people to take a DIY approach to making materials and clothing through access to tools, and how a material-making culture can be based on an integrated relationship between communities of human and nonhuman actors.

The next section will outline another key quality that is adversarial to the dominant structure of producer and consumer: openness.

3.6.3 Openness

Today, many consumer products—from sneakers to smartphones—on the market are difficult or impossible to repair because consumers lack the skills or knowledge of the inner workings of the product. Impenetrability may be designed into some items, particularly complex digital products, resulting from an ostensible consumer desire for simple, intuitive interfaces—in this way the internal processes and mechanisms by which a product operates are kept hidden (van Helvert 2016, 111) and the product has become a "black box." Designing against repair also comes in the form of planned obsolescence, an economic scheme promoted by Bernard London in 1932 to keep consumer demand steady, which is positioned as a vehicle for economic gain, but is a damaging imperative for resource extraction and overproduction (Catterall 2017). In opposition to such design practices that seek to limit opacity and malleability of a product, designing for "openness" allows a product

to be modified and shared "because its design is publicly accessible" (opensource 2016).

A key term here is "open source," which originated in the world of computer programming and denotes software with free and publicly available source code. In the early days of software programming, from the 1950s to '70s, software was developed in scientific or academic laboratories and collaboration and sharing between programmers was encouraged to promote innovation (Von Hippel and von Krogh 2003). Open-source software means users can freely copy and edit the existing source code, creating multiple versions and iterations of a digital object in a way that problematizes the producer-consumer hierarchy, and even distributes ownership of a product. The Linux operating system, originally created in 1991 by Linus Torvalds while he was a student at the University of Helsinki, is a success story of open-source programming as the writing of the software was decentralized and distributed among users (Sennett 2008, 23). As Linux was collaboratively developed online, its source code is "open," meaning that it is freely available to any user. Sennett calls it a "public craft" to which anyone can contribute—Wikipedia is one of its products—but it is not the norm of the software market, nor any market dominated by trade secrets and black-boxed production. Von Hippel and von Krogh (2003, 209) identify that the type of "communal behavior" that produced Linux would become "a central feature of 'hacker' culture,'" a culture populated by curious and creative users—not necessarily

criminals—who wish to understand system to the best of their ability, so that they can reengineer it to their needs.

However, successful and isolated models of open products do not guarantee that "openness" is an ideal quality of making. It is possible that different types of exploitation emerge when seeking "openness" through design. "Fashion hacking" and co-design proponent von Busch claims that openness is "... an essential part of co-creation and co-design, where the designer steps back from the drawing table and instead facilitates the creative processes among users, rather than coming up with a finished solution" (2012, 451). By leaving the door open to users, designers are encouraging innovation with the tools they have created—often with unintended results. Open source designs are only useful for consumers who wishes to take part in the process of making; not every consumer wants to be a producer, nor do they have the time, skill or knowledge to be able to construct or repair goods. Van Helvert points out that it may be the lack of these two things—skills and knowledge—that stops a consumer from repairing a product:

> Most of us do not have the knowledge to perform repairs ourselves. Additionally, it is sometimes impossible to obtain replacement parts, and many devices cannot even be opened up. (2016, 109)

Remaking fashion products to be more open may be a difficult task, as fashion has a complicated relationship with the concept of openness. Brands wish to keep their suppliers hidden in order to protect their supply chains from competition, or to

obscure the realities of production from the consumer. Those same brands may not actually know the realities of production themselves, due to the vertical disintegration of the supply chain (suppliers hiring their own contractors, etc.). Despite this, there are specific practices that echo open source which exist in the dominant fashion industry: a standard design practice for many brands includes the borrowing and copying of ideas and even entire items—including cut, material, colors and styling—from other brands. Pike (2016) identifies that this practice is not only limited to fast fashion brands, such as H&M or Uniqlo, that borrow from high-end brands, but includes high-end brands such as Chanel that target smaller brands to source ideas and inspiration. Once a garment has entered the complicated logistics of distribution —especially after it appears online or in brick-and-mortar retail—it's difficult to track and protect its design under copyright or intellectual property laws.

Searching for inspiration by looking at pre-existing garments is a typical starting point in the fashion design process (Raustiala and Sprigman 2006). Designers research a collection by referencing and borrowing details—color, textiles and shapes—which are often found in extant garments or manners of dress. This is similar to the hierarchical collaborative design process which Sanders and Stappers (2008, 5) identify as "user as subject," in which consumer research leads the design process, and designers take "inspiration" by imitating popular styles. Mackinney-Valentin (2010, 22) identifies that trends are formed when styles are diffused and

innovation: the styles are shared and spread, and then developed to create the "appearance of novelty." This systematic borrowing of ideas and recycling of designs is how trends are formed. This trend dynamic in the fashion system follows a kind of unspoken open-source logic, and is accepted as a part of the industry. This strengthens a brand's market power and provides social benefits for consumers: it effectively relieves anxieties related to production (Will a product sell?) and consumption (Will I look fashionable?) in the context of fashion. In this sense, the "source code[42]" of one brand's garments—in terms of shape, color, material—can be can be reverse engineered, broken down to its constituent parts and reshaped to fit the goals of a different brand. This process has been occurring since at least the 1930s in the USA (Raustiala and Sprigman 2006, 1687) and remains a common practice in design studios of fast fashion multinationals. Indeed, this process is what makes clothing into "fashion," as Valerie Steele describes it:

> Clothes is the general and inclusive term for all the various coverings and articles of dress designed to be worn on the human body. Fashion is a particular kind of clothing that is 'in style' at a given time. The concept of fashion therefore implies a process of style change. (Steele 1997, 3)

By this definition, fashion can be understood as a system of constantly updating technological parts.

[42] An investigation on the distribution of ownership in co-design situations is needed, but is beyond the purview of this study.

Although this view of garments as technologies that can be reversed engineered gives the notion of garments being "open-source" in one sense, true openness—where the boundaries between producer and consumer are destabilized—would threaten the power of large brands in the dominant fashion industry. A key issue here is consumer agency: any notion of "open-source" in the dominant fashion industry at present is not for the benefit of consumers, it is dictated by the market or profit- and growth-driven desires—desires which, when considered at a global scale, have created unjust and unsustainable conditions on Earth. How can open-source logic be applied to fashion in a way that can gives consumers agency in the fashion industry and empowers them to make ethical choices?

Openness in fashion design can take many forms, not only related to style, but the architecture of a garment or brand. It can be built into intellectual property rights, and the laws that retain ownership of a product, it also can be built into the technical details of how a garment is engineered. Recent examples of both of these will be raised here, to illustrate the potential manifestations for openness in design.

Serpica Naro, a fashion design collective founded in Italy in 2010 by a group of young Italian garment workers, is a project that avoids the difficulty of a brand to retain its intellectual property rights by openly allowing full use of its branding. The founders created a fictitious designer—Serpica Naro—and developed a full branding and communication campaign. The "designer "—a collective in this case—then gave

full use of their name and designs to consumers. The members of the collective were fashion industry workers at the beginning of their fashion careers who were frustrated by the precarious short-term contract-based employment in the Italian fashion industry. They wanted to ask the question: "How could we have a brand that didn't just accumulate value, but redistributed it; and how could we find an alternative to the overproduction of creative workers, itself a major cause of the low wages and chronic underemployment typical of the sector?" (Romano 2015). In other words, this group wanted to use the concept of openness to challenge and criticize the dominant fashion industry. Based on the concept of a "network artisan," they offered people access to their patterns and ran workshops online that gave advice on how to start a small fashion business. Their platform has clear social goals and their physical office space provides co-working labs where people work creatively in a non-competitive, collaborative context. The Serpica Naro project is important in the context of this dissertation because it empowered consumers and participants through collective projects and learning tools to question the dangerous nature of a fashion industry that engenders such precariousness for young workers (Gherardi and Murgia 2013).

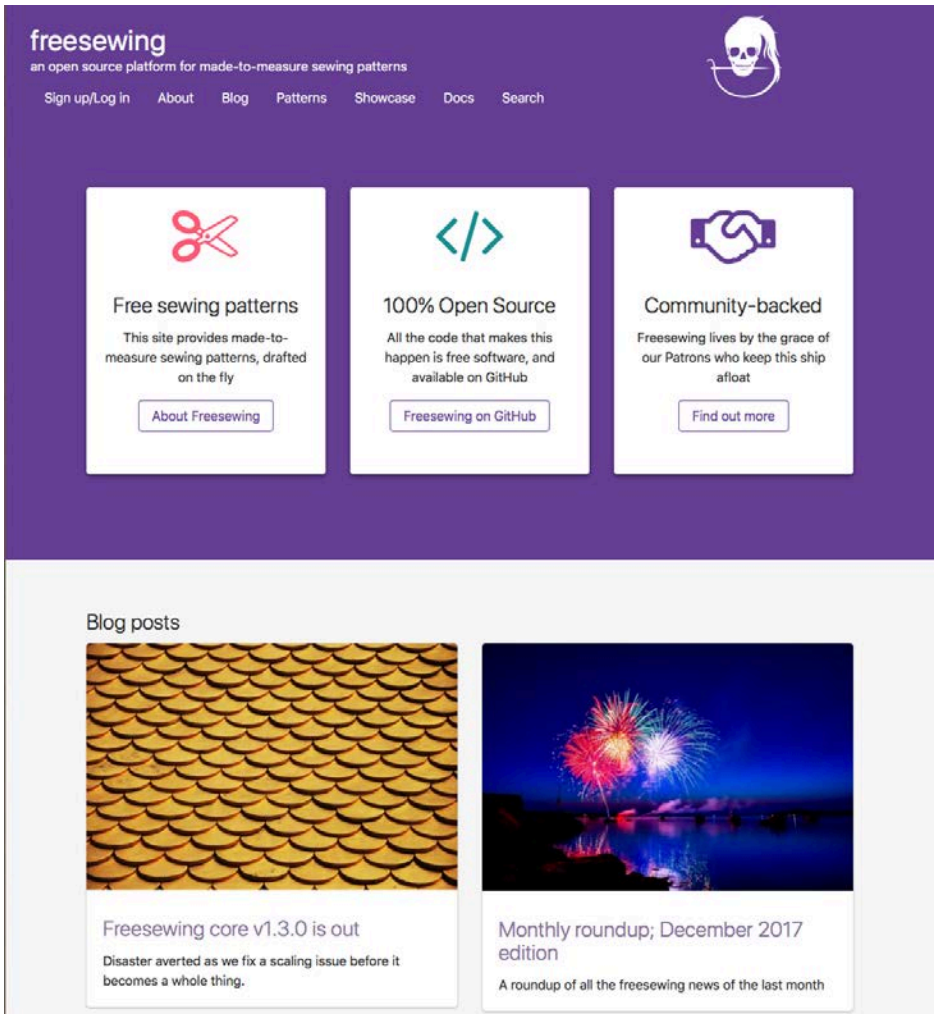

Figure 11 – Freesewing. Image: http://www.freesewing.net.

Another example of openness enabling innovation is freesewing.net, an open-source web-based application, that provides free basic patterns known as "slopers." Patterns in fashion design are typically flat 2D drawings that lay out the engineering of a garment, which can then be used by those who may not possess specialized training in garment making. At freesewing.net, a web-based application made using an open-source and collaborative online coding tool called Github, users can input their measurements and receive personalized slopers at no cost (de Cock 2017). Users can download these and other custom patterns to fit their bodies for free, and

they are provided with basic tools to alter or enhance garments, which includes a drafting tool that makes a pattern with your measurements, instructions for assembly, and alteration information to customize the design. The online application also encourages users to share their personalized patterns and sewing projects.

By providing personalized patterns and connecting home sewers online, consumers are encouraged to re-skill themselves, thereby reclaiming their agency through access to tools and sites of production. Another example of openness in regard to technical aspects of pattern making is Seamly2D (previously called Valentina), an affordable and open-source patternmaking software. Historically, pattern drafting for fashion design has been done by hand—the signature of a brand can be its fit, rather than styling, and expert fit technicians are highly sought after. As a means of raising consumer agency, new technologies are offering alternatives to traditional methods regarding the technical side of fashion design. Mainstream patternmaking software such as Patternmagic or Gerber Systems have expedited the process of patternmaking, but they can be prohibitively expensive for small brands. Open source patternmaking software for fashion design, such as Seamly2D, provides an alternative. This software—developed by a team led by programmer and fashion designer Susan Spencer Conklin, and funded by donations—is maintained by a community of users who share tools, designs, and tips. The developers identified the lack of affordable software available for small- to medium-sized garment businesses,

and developed Seamly2D and a larger "stack of open source tools to remake the garment industry" (Seamly2D 2016) as a result.

The dominant fashion industry is not typically an open system, but the examples above show that openness in fashion means giving consumers access to the tools of production. Openness as a design practice and open-source tools promote methods for fashion design that enable a consumer to pry open fashion's black box, or to circumvent it completely. The next section will look again at papermaking, to evaluate how openness in community-based material-making manifests. This will be explored by looking at the communal materials, tools and workspaces in handmade papermaking villages.

3.6.4 Communal Materials, Tools and Workspaces

In May 2016, I visited Kurotani, a small village in Kyōto Prefecture, known for its long history of washi-making, communal working facilities and tool-sharing (Turner 1983). Kurotani is only a small village now, and has been adjoined with neighboring Ayabe City (population 33,000). Ayabe City has a long history of textile production, and would have served the needs of nearby Kyōto. Now, it is known for being the location of the headquarters of Gunze, one of Japan's largest textile and apparel manufacturers.

Washi making began in Kurotani around 800 years ago by samurai warriors of the Heike clan who were escaping war (KWKK 2017). These original papermakers developed techniques for producing some of the strongest paper in Japan, and their legacy continues, as paper made in Kurotani has been used by French art restorers from the Louvre, and by printmakers such as Jasper Johns. Now, the papermakers in Kurotani are working to develop new materials and designs for their paper, including a very strong foldable laptop stand.

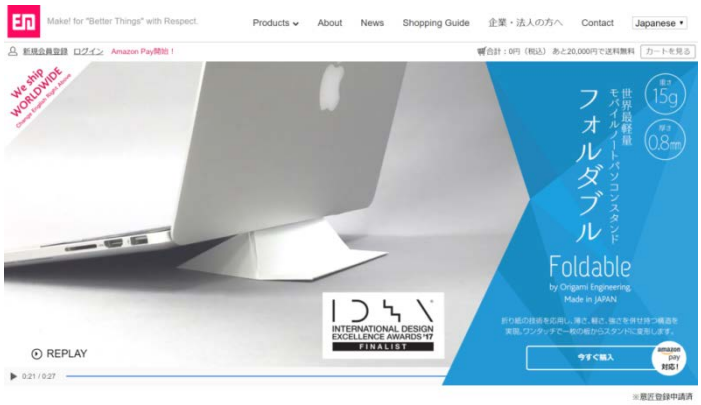

Figure 12 - Foldable laptop stand. Made in Kurotani, which is an area known for making very strong paper. Image: KWKK 2017.

They are also reaching back and trying to revive some of the techniques and materials that haven't been in production for many years, including *shifu* (fabric woven with paper yarns, Figure) but the price at the moment is quite high—enough to make one kimono cost ¥250,000. Clothing has long been part of Kurotani's washi history, as the strength of the paper made it ideal for kamiko garments, and the proximity of the village to Kyōto meant there was a demand for paper fashion during the Edo Period. Paper was used in producing Kyōto's fashion for more ways than

dressing, it was also used for stencil dyeing, transferring motifs, and even cocoon bags for sericulture (KWKK 2017).

Figure 13 - Shifu, cloth woven with paper yarns, from Kurotani. Image: KWKK 2017.

Kurotani village is located near a two-lane highway that snakes north from Ayabe city towards Mount Asago. Upon exiting the highway, I saw an aged sign depicting a woman making paper and the words “Welcome to Kurotani.” Though it is officially now part of Ayabe City, this small hamlet retains its name and identity as a papermaking village. This is evidenced by the signs depicting papermakers, and the fact that it is the location of an original co-op (kumiai) and communal facility.

Kurotani is unique as there are two communal work spaces for papermakers in the area. The first, as described above, is in Kurotani village proper and the second

can be found in a disused middle school in Ayabe City, which the local government commissioned the co-operative to operate in 2005.

Figure 14 – Kurotani village. The communal workshop has fresh water flowing through it constantly.

Figure 15 – Kurotani village. The communal workshop is an agglomeration of a several small buildings.

Figure 16 - Kurotani, Ayabe City. The classrooms have become papermaking studios.

Figure 17 - Kurotani, Ayabe City. The disused school is a paper museum and public workshop.

The kumiai and communal facilities in Kurotani are some of the earliest documented examples of organized community support for papermaking. The kumiai came together in 1892 to organize papermakers in the face of mechanization at the turn of the century, and helped them create ways to sell their paper, stabilize

competition and access to raw materials. The current kumiai office building has a small gallery upstairs which contains some rare paper relics—including an original print from American artist Jasper Johns, who ordered Kurotani washi directly from the local kumiai to use in his work. The paper items on display in the museum show Kurotani as a papermaking town, but perhaps one that is on the decline—the valuable items are situated in the past. Most items were sourced from the local abandoned houses or donated by local residents. Besides the Johns painting, other museum items include kamiko, paper obi, and rare samples books that kamiko makers would have shown to customers to demonstrate the kinds of printed and stencil-dyed paper that was made in the village.

Figure 18 – Kurotani village. Stencil-dyed kamiko.

Figure 19 – Kurotani village. Stencil-dyed kamiko and sample books.

The kumiai building itself looks like a small house, a view perhaps exaggerated by the small private homes built closely around it. It faces a stream which begins 500

meters away at Yama no Kami Shrine and flows through the village's communal workspace, providing the papermakers with a source of fresh spring water with which to make their paper.

Its communal papermaking facilities are situated directly in front of the two-story building which houses the kumiai. It was built soon after WWII, and smaller buildings have been added to the original structure. The original space is a concrete room with tubs and buckets, and contains custom-built fiber beating machines made from wood.

Figure 20 – Kurotani village. Custom-made beating machines.

Figure 21 – Kurotani village. Interior of communal working facilities.

The communal facility is really a group of buildings, and through any of the entrances you find yourself in a room filled with buckets, water, and raw materials in various stages of preparation. The largest room is made from concrete and wood, and houses the soaking vats and beaters. There is water in every room of the communal work space: Tubs of water, taps with water dripping, flowing water, and water stopped in pools. Raw materials—tororoaoi and the inner bark of the kōzo trees—are soaked in the tubs of water, and, while the space is open, papermakers will often be making paper sheets out of the communal wooden vats. Water is always present in any papermaking studio; it flows, bubbles, pools, boils, and soaks as the papermaker does their work, scooping fibers out of the gooey liquid in the vat. Kurotani is no

exception. While this is a communal workspace, only one papermaker was using it at the time I visited, but she had recently become engaged and was planning to soon move to another city. She was originally not from Kurotani, but decided that she wanted to take up papermaking, so she called Kurotani's kumiai to ask if she could join their training program, but they refused her. She eventually called Kurotani again, explaining that she was steadfast in her decision to become a papermaker. They took her on, and she has been making paper in Kurotani since 2004.

Figure 22 – Kurotani village. The papermaker at work in the communal facility.

Figure 23 – Kurotani village. Fibers ready to be beaten.

My contact person in Kurotani was Mrs. Y, the elected chairman of the kumiai. Now in her late forties, she was born and raised in the village but left for work in nearby Kyōto for a time before returning home to become a papermaker like her mother and grandmother. According to Mrs.Y and her mother, until the 1960s, four out of every five houses in Kurotani would have been occupied by papermakers, and

since the work was done in the home by the entire family, they would have numbered in the hundreds. At the time of interviewing Mrs. Y (May 2016), the number of papermakers in Kurotani—including Mrs. Y herself—was nine.

Individual papermakers in others regions, such as Tosa, often have business contacts of their own and are able to operate independently from the kumiai, but the kumiai in Kurotani has an important position as middleman between customers and local papermakers: All papermakers in the village must be a member of the kumiai, and all orders go through the kumiai and are distributed evenly to ensure that all members have sufficient work to make a living. The name of the kumiai—*Kurotani Tesuki Washi Kyōdo Kumiai* (Kurotani Handmade Washi Association)—is applied to every product from the region; individual names of the papermakers are never seen on any products, and orders cannot be taken directly from clients. This is intended to reduce competition between papermakers and promote the reputation of the region as a whole, by encouraging papermakers to continue to make products that match the quality of those made in the past. Kurotani washi still has a strong reputation in Japan —in 1917 the Japanese government called it the strongest in Japan, and in 1983 it was recognized as a piece of intangible cultural heritage (mukeibunkazai) (KWKK 2017).

Openness here means access to the tools of production. This open-access can be seen in the way the kumiai welcomes papermakers to come and live in Kurotani and become papermakers, providing them with the knowledge and tools they need to

connect with a long line of history in their practice. In fashion, openness has a complicated relationship to design, as it can mean that a designer's ideas can be borrowed or stolen without credit. In Kurotani, this same borrowing is encouraged, as the papermakers do not put their names on the products they produce.

3.6.5 Transparency

In this section, transparency, the third and final quality outlined in the beginning of this chapter will be discussed. Transparency, given the context of the black box of fashion production, is a quality relating to the ability of the consumer to see inside the box, to see and access the sites and materials of production of fashion. For the producer, this relates to accountability. If they reveal the inside of the black box, they may be called on to answer to any decisions they made in their supply chain that influences social justice or environmental sustainability. In the non-hierarchical relationship engendered by the third industrial revolution, the consumer-producer or hacker is finding their own ways to access materials and developing alternative sites of production.

In this section, transparency relates to access to the sites and materials that animate fashion, and shows several ways that this quality manifests in contemporary design practice, in big brands, as well as grass-roots initiatives, startups, and proposals for ways of living. Then, it will be further explored by looking at Japanese

papermaking from the perspective of cottage industries, and how an integrated relationship with one's immediate landscape in a material-making culture can contribute to the understanding of transparency.

By the time a fashion item reaches a consumer, it has passed through a long, complicated supply chain. In the case of plant-based textiles, such as cotton, this chain can include the following actions: planting, harvesting, processing, spinning, weaving, cutting, sewing, shipping, retail, use, and disposal. Due to this long, and often global, supply chain, clothing can be difficult to "unpack"—to understand the complex web of contingencies that a fashion item is dependent on and connected to—even for researchers. In response to a consumer desire for more transparency, some brands are inviting consumers to see where and how goods are made. Nike, H&M and Patagonia are global apparel companies that each have a large environmental impact and set standards for best (or worst) practices in the industry. In 2014 and 2013 respectively, Nike and H&M began large-scale projects to make their supply chains more transparent by creating online interactive manufacturing maps, which show the location and contact information for their suppliers, while Patagonia shares research about the environmental impact of garment production. However, for most producers it is easier and more cost effective not to share this information in public reports. This has led to widespread criticism and questioning from journalists and consumers, who

have been seeking accountability from the fashion industry (Zerbo 2016; Young 2013).

Some large companies have made efforts to change and create standards for best practices. In 2013, Nike released the Making app, "a digital tool that shares some of the data the company uses when considering the environmental impact of the materials used in apparel and footwear design" (Pritchard 2013). Understanding materials is vital in efforts towards a more environmentally sustainable fashion industry. The app uses information from the HIGG index to rate 22 materials that Nike designers use most. It emerged as Nike's designers were confused themselves by the vast range of so-called "sustainable" materials that were being promoted to them, so in 2004 they hired environmental consultancy firm Brown and Wilmanns Environmental (who also set up Patagonia's environmental sustainability initiative) to research and grade these materials. The Making app is based on this data.

What the efforts from big brands show is that it is possible to develop ethical practices in fashion, but their desire to be transparent may not yet be enough, as the results of their actions cannot yet be determined. Fletcher (2012, in Catterall 2016, 34) offers a direct criticism of their efforts, noting that "…creating sustainability involves an alternative approach…Sustainability in fashion is more than a new initiative around chemical restrictions, a materials index or universal standards and tools for defining and measuring environmental and social performance. It is a chance

for all of us who are part of the broader fashion ecology to flourish." Further, these were large-scale research projects that would have required capital to initiate. How could smaller brands, or individual consumer-producers design this kind of transparency into their work?

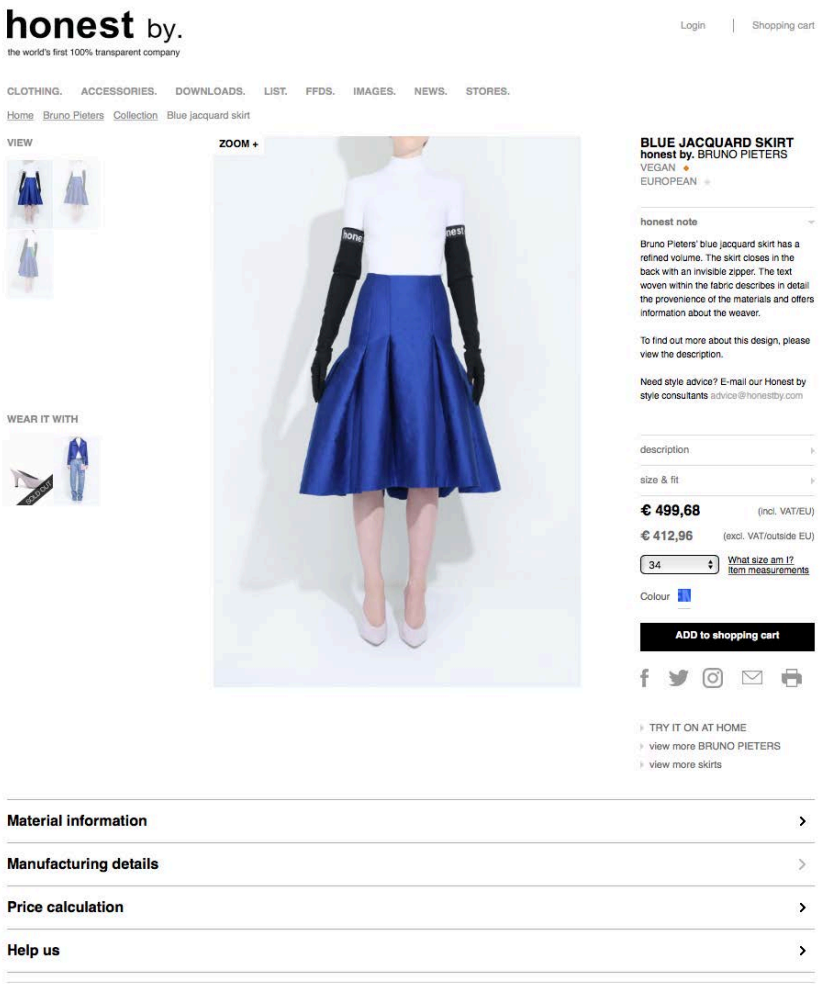

Figure 24 - Honest by Bruno Pieters. Image: http://www.honestby.com.

One small brand with transparency as its goal is the label of Belgian designer Bruno Pieters. Each high-end piece of clothing sold on his "Honest By" brand's website comes with detailed information about production, sourcing, costing, and carbon footprint. In some cases, the location of assembly, factory name, and even

contact information for the factory are made public. The brand also details its pricing strategy as a way of educating customers and rationalizing material choices. This allows customers to see why a garment can fetch such a high price as opposed to fast fashion outlets who may sell a similarly styled garment for significantly less. For each item, the brand lists the cost of each component, from fabric to fasteners, and calculates the final profit made by Honest By. What Pieters is doing requires rigor and is time-consuming—for both the producer and the consumer—but this act of due diligence gives consumers a detailed look into fashion's black box and could have deterrent results if it were to be adopted by fast fashion brands who benefit from the distance between consumers and the materials and processes that animate consumer products.

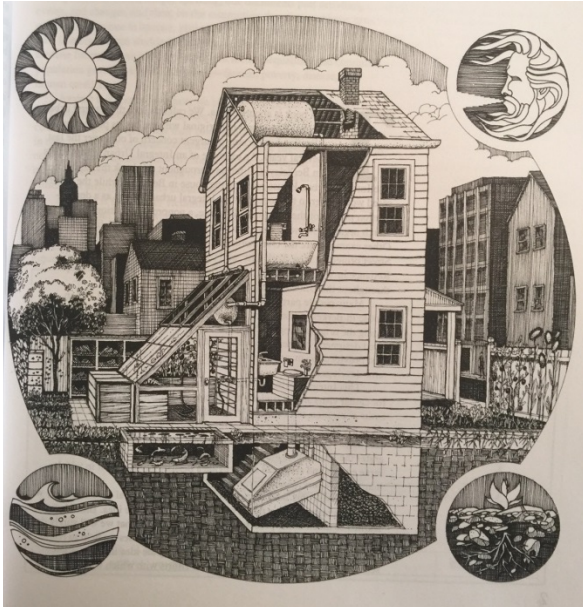

Figure 25 – The Integral Urban House. Image: Olkowski et al (1979, 1).

If this approach to transparency were taken to its apogee, all aspects of design and production—related not just to fashion, but all materials and products in everyday life—would could be completed domestically. In the early 1970s, architect and educator Sim Van der Ryn led a project in Berkeley, California, that attempted to do just that, called The Integral Urban House. The house was a proposal for a "physiological" dwelling—a kind of proto-biotechnological system of living. It operated according to a closed-loop system designed to "harness the energy circulating between the environment, technology and bodies, both human and animal" (Richards 2017, 32), placing the building or facility at the center of the "synthetic metabolic cycle," the products of which would be heat, nutrients and the calories needed to sustain the life of the dweller (Richards 2017, 32). Through the house, van der Ryn proposed that humans could live transparently, in a way that they understood and were directly involved with the production of materials around them—particularly those that were consumed and worn. Though the house was initially envisioned to be run by an individual or family, the project would be almost entirely run by volunteers in later years. The inability for this project to spur follow-ups, or to remain economically sustainable could be because those running it did not have access to digital technology—perhaps his vision was ahead of its time.

Figure 26 - Ecovative. GROW lamp Kickstarter project. Image: Ecovative (2018).

Melding the transparent aims of van der Ryn with a DIY approach to making, New York-based startup Ecovative is reframing do-it-yourself as grow-it-yourself (GIY). Using simple molds, they control the growth of oyster mushroom mycelium, the root structure of the fungi. In its upstate New York factory, Ecovative grows biodegradable products such as packing foam, building materials, insulation, a product similar to corkboard, and have recently developed a mycelium textile prototype. It has also developed a GIY toolkit for at-home growing and experimentation, including a table lamp that recently raised over $25,000 on Kickstarter. In order to expand its product offerings, it invites consumers to grow mycelium-based products in their own molds and share the product designs on the company's website, much like the above-mentioned Serpica Naro project. This project is a unique approach to transparency in that it allows a consumer complete control of a product's lifespan, from growth to disposal.

Building on these approaches to reclaiming ownership over materials as a means of seeking more transparent production methods, a consumer could potentially adopt a DIY approach to making their own garments by acquiring materials from a local source and overseeing design and manufacturing. There are some companies who provide a simulated version of this experience, and it could be argued that the accomplishment consumers feel upon making something themselves is driving the success of collaborative design schemes (Chapman 2008). Ikea, for example, offers furniture to consumers at a lower price in exchange for assembly, but this isn't a form of transparency connected to DIY in a fundamental sense as the customers do not have the privilege of participating in the design or selection of materials of the furniture they assemble. Recent startups who make knitting machines have struggled to develop at-home textile production technology, with some not being able to bring a viable product to market (Electroloom 2016). Following contemporary approaches to transparency, a consumer could begin creating a fashion item themselves by acquiring materials from their source and overseeing design and manufacturing. In line with this approach, recent startups have attempted to bring at-home knitting technology to market. Until now, knitting has been done at home using traditional needles, or using hand-operated knitting machines, but access to digital whole-garment knitting machines would be difficult or impossible for the consumer.

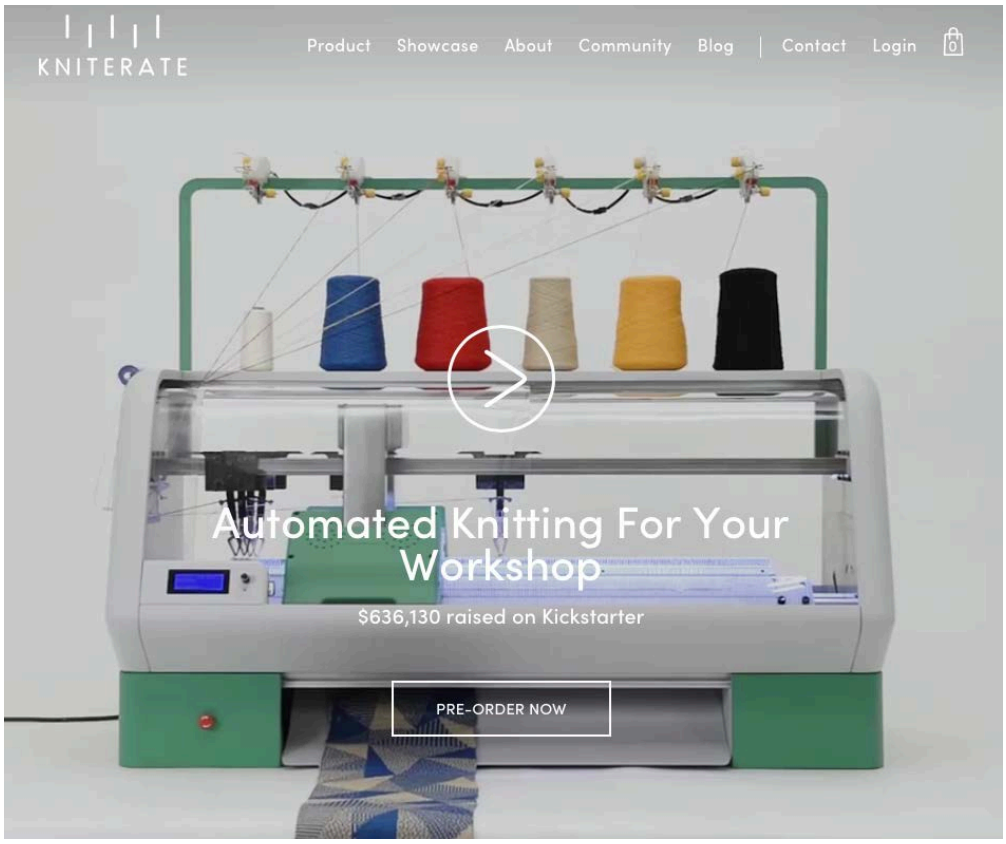

Figure 27 - Kniterate. A digital knitting machine. Image: http://www.kniterate.com.

To answer the demand for innovation in at-home knitting technology, Barcelona-based company Kniterate, which started as an open-source experiment, has recently gained over $600,000 USD in crowdsourced funding (Kniterate 2017). Its machines are now available on their website for $7,999 USD. This is evidence that smaller brands may be seeking open-source production technology, and also that certain consumers are supporting technology that they can use at home, schools, or communities to make fashion items themselves.

This is a departure from the idyllic, pastoral visions of handcraft and making espoused by Yanagi or Morris in the 19th and 20th centuries, because consumers now have access to information about the social and environmental issues related to the

fashion industry at an unprecedented level. At-home production can be seen as a resistive act, moving away from the dominant structures of the fashion industry. The notion of how a cottage industry, or at-home production can empower consumers to be more aware of the sites and materials of production will be discussed in the next section, by looking again at papermaking in Japan.

3.6.6 Cottage industries

Papermaking is not done alone, and traditionally it took either an entire family, or members of a community to complete. While competition was likely apparent within the middlemen and the larger-scale operations, in the cottage industry there was a level of collaboration at the stage of preparing the raw materials. Washi-making was traditionally a cottage industry in Japan, typically undertaken by farmers in mountain villages during the winter months when farming was impossible due to the snow (Narita 1980, 35). Papermaking was winter work for farmers, but became full-time year-round work for many families when paper was used for many everyday purposes, from the Edo Period until the late 19th century, as is related by Hunter (1967, 217) in his report on Japanese papermaking villages as late as the 1960s.

In traditional Japanese papermaking, the work would have been done in and around the home: the fibers for the paper are extracted from trees grown between local farming plots, or found growing wild in nearby mountains. In the early part of

papermaking history in Japan it was made in Buddhist temples, but once it became more popular and widely used it began to be made in the home. Multiple generations of relatives would commonly live in the same household, and papermaking work was split up among them. This distribution could be within the family, or the community.

Figure 28 – Kurotani, Ayabe City. A family sorting sheets of paper by quality before sending it to the customer.

Papermaking is a material-making process that is contingent on a relationship between communities of people, various species of plants and their local landscapes. Traditionally, papermakers—people who made sheets of paper—worked from home with their family, using locally harvested plant fibers and clean water. Their studio essentially becomes one small set of processes, embedded in the landscape, that negotiates with the materials around the studio.

The process of making at home is called *kanaikōgyō* (A contraction of *Kanaisei Shukogyo* 家内制手工業), which translates to "making things by hand in the home," "home-made" or "cottage industry." This denotes a practice of working from home similar to that undertaken by Anderson's (2012) "makers," or von Hippel's (2016) "free innovators"—labels that refer to people who are developing new ways to create in private or shared spaces. This process was suitable for households with ample space for the steaming and drying tools, and vats required for papermaking, but not all regions could support large households, and not all papermaking families could afford the tools. After local initiatives began building communal workplaces and tool-sharing schemes to stimulate growth in an already-declining industry, people had access to buildings which housed expensive machinery, such as beaters (to replace the husband-wife hand labor of loosening the fibers), vats (*sukibune*) and screens (*suketa*). Once the communal systems were in place, papermakers could decide the scale at which they would like to apply themselves to papermaking, and could even take on small jobs from bigger producers as contractors, or subcontract only part of the process—like *chiri-tori*, or cleaning the bark—to make some extra income.

Figure 29 – Kurotani, Ayabe City. A husband and wife using wooden clubs to beat the fibers for papermaking.

In the case of washi-making, this cottage industry, in other words, means that each member of the family contributes to the livelihood of the household by working on one part of the process of making. As of 2018, the year this study ended, papermakers in Japan rarely work from home or with their families. While some family-run practices or companies of varying scales are still in operation—the Hamada family in Tosa, or the Senda family in Mino for example—it is much less common for papermakers to work from a room within their house or on their property.

Figure 30 – Kurotani village. The signs at the entrance to the village depict a woman making paper.

Figure 31 – Kurotani village. The signs at the entrance to the village depict a woman making paper.

In the interviews I conducted with community organizers and paper makers, it was often mentioned that one of the final parts of the papermaking process—pulling sheets of wet pulp out of a vat of fibers suspended in liquid—was done by women. One reason cited was that they could work from inside the home and thus take care of the domestic tasks such as child-rearing while they worked. In Kurotani, I visited Mrs. Y's mother, who showed me her vat-room.

Figure 32 – Kurotani village. Mrs. Y's mother's vat room.

Figure 33 – Kurotani village. Mrs. Y's mother and I removing the black bark with sharp knives.

It was located a five-minute walk away from the communal papermaking facility in Kurotani village, and situated directly in front of the door to her home. From the front door, she could walk about 20 steps and be inside her vat room (*sukibeya*). The size of the room was about 2.5-by-3 meters, and inside were all the tools needed to make sheets of paper—a vat, screens, aprons, buckets, etc. She no longer makes paper, but at one time it was her full-time job, along with raising children and taking care of the home, until the late 1970s, when she was in her 20s and 30s. The day I visited her, she was doing one part of the raw material preparation process that was especially time-consuming and difficult—removing the dark outer bark from the kōzo, using a sharp knife. This job can only be done by hand, or by

using environmentally damaging chemicals, so the elderly women of Kurotani village are hired—and paid—to do this process. I was told that not only is there no other way to get it done, but in trying it myself I saw that it can be dangerous because of the sharpness of the knife used. She informed me that they used to wrap their fingers with old bike tires for protection, but when I visited we used thick rubber gloves. I participated in this step of the process again later with Richard Flavin in Ogawamachi, Saitama. Due to the volume of the raw material, he cannot do this process alone, and every year during his "bark-off" party, he brings together a group of volunteers to help. For two days, we sat and peeled the steamed bark off the trees, and then used putty knives and windshield scrapers—instead of Kurotani's sharp knives—to remove the outer bark.

Figure 34 - Ogawamachi. Removing the black bark with a putty knife.

Traditionally, the trees that produce the raw materials for paper (kōzo, mitsumata or gampi) would be found, harvested and brought home by the grandfather and father of the household. Then, they would then prepare the raw materials by steaming them for a number of hours depending on the amount and thickness of the branches. After steaming, the bark is pulled off and bundles together to be dried once in the sun so that mold won't form. Mold is a constant danger throughout the process, and is one reason why papermaking is considered winter work. Summer in Japan can be hot and humid: the perfect conditions for extra organisms to grow on the fibers or in the vat. Some raw materials will stay at this stage—peeled and dried—for the entire year, until they are needed. Because this step

in the process requires so many hands, and so much effort, it simply isn't economically feasible.

Figure 35 - Ogawamachi. Strips of bark are hung to dry after peeling.

Figure 36 - Ogawamachi. Strips of bark are hung to dry after peeling.

In almost every papermaking community that I visited, I encountered people with a desire to grow the raw materials in the place they make the paper. The phrase "it's not (name of town) paper unless the kōzo comes from here," was spoken to me numerous times. In Kurotani, Yamashiro took me to the kōzo plot that was being nurtured by the town's nine papermakers. Despite their effort, it remains a novelty as it doesn't produce enough raw material to serve all their needs.

Figure 37 – Kurotani village. The communal kōzo plot, post-harvest.

Harvesting the branches of the kōzo, mitsumata or gampi trees happens once a year, but the process of preparing the raw materials and making paper repeats on a roughly 10-20 day cycle, depending on the ability of the papermaker. The papermaker will only prepare as much as they need to fill each order each time, or the precious fibers will rot.

The dried bark is then laid in a shallow pool in a river to bleach in the sun (a process known as *sarashi*). This softens the lignin that holds the bark to the fibers, so that the papermaker can begin the process of removing the outer layer of the bark with a small knife (*takuriko*) or—as I used in Ogawamachi—a putty knife, to reveal the long white fibers on the inner layer of the bark. The process can also be halted at

this stage, and the material prepared for storage by leaving them to dry in the sun. Once the bark is removed and the pulp is ready, it is then boiled for two hours in a soda ash solution to soften the fibers and to separate any unwanted bark, discolored cellulose or lignin. These white fibers are then brought to a nearby river or pool, and laid out to be further bleached by the sun. This natural bleaching process can also be done by leaving the strips of fiber on the snow. Once these tasks completed, the most painstaking step of the process begins.

Figure 38 - Echizen. A woman doing chiri-tori in a public facility.

Figure 39 - Echizen. The fiber "blossom."

In a basket suspended in the river, under a makeshift shanty (easy to dismantle and move if the direction or surface of the river shifts), the papermaker will sit on their knees (*seiza*) and hover over the white fibers—called a "blossom," because of

the delicate way it spreads in the bowl when they put it in—to pick out the remaining dark black specks of outer-layer bark by hand or with tweezers. This stage is called *chiri-tori*, and is where the quality and consistency of the finished product is decided. This step was typically done by women, and gave them a chance to talk and share stories while they sorted the fibers in the cold water of rivers. This stage is no longer done in the river, but the rest of the process is the same—you can see that the woman in Figure 38 is alone, but there are cushions next to her that will later be occupied.

After this step, the fibers are beaten mallets, or mechanical beaters to loosen the fibers. In Mino, Gifu Prefecture, famous papermaker Sawamura still uses the double-mallet method to beat his fibers. Once the beating process is complete, the fibers are dried in bundles, and are finally ready to be made into paper. They are introduced in the necessary amounts into the vat, along with mucous from the root of the Sunset Hibiscus (tororoaoi), and then papermaking can commence. The milky liquid in the vat seems to undulate as the fibers swirl between scoops; the papermaker swishes the mixture, to raise and evenly distribute the fibers—this is the papermakers work, to emancipate the internal fibers of a specific kind of tree, and then capture them in the shape of a single sheet of paper.

Figure 40 - Shiroishi. The washi-makers vat and screen (sukibune and suketa).

Each sheet is pulled from the vat and formed by scooping fibers using a screen called a *suketa*, then swayed back and forth and side to side to lock the fibers together. The final movement is tapping the water out of the screen, then the individual sheet is placed on a table, and will eventually form a stack. In some studios, Such as Mr. A's studio in Shiroishi, a single piece of thread is placed in between each sheet in order to separate them, but in others, such as Mr. Senda's studio in Mino, there is no need, as the ratio between water, tororoaoi, and pulp in vat is so perfectly balanced that the wet sheets do not stick together, even after pressure is applied. To remove excess water, pressure is applied to the completed stack of sheets using stones, or car batteries, in the case of Mr. A in Shiroishi. Finally, each sheet is peeled from the stack and dried on planks of wood in the sun, or on electric drying machines.

Figure 41 - Mino. Mrs. Senda applying a freshly-made sheet of paper to the electric drying machine.

Figure 42 - Shiroishi. Abe's group uses metal boards to dry the paper in the sun at a disused kindergarten.

The dried sheets of paper are then grouped according to color, quality and consistency, cut to order and then packaged and brought to market—individually, or through the kumiai depending on the household or studio. Every member of the family takes part in this critical and reflective stage—this step gives them a chance to reflect on the quality of materials, and of their effort in each step of the process. As will be described in the following sections outlining the data gained during the site visits, papermakers often work alone nowadays, without the support system of a multigenerational family or wider papermaking community.

3.6.7 The Senda Family

I had the opportunity to visit the Senda family in Mino, Gifu Prefecture, who still operate in a traditional setting in that they have the processing tools and equipment on site at home. The young Senda couple are in their mid-late 30s and they, together with their apprentice, make handmade washi in their home, a traditional *minka* house that is large, sprawling, and made of wood and glass. Their home and their studio are one and the same, and they have named their operation Taikō Kōbō, which roughly translate as The Great Sun Studio. Their house is located in a difficult-to-locate village, which doesn't show up on Google Maps—the only way to access the community is to park one's car 20 minutes away and walk through a small village, then up a long flight of stairs, passing close to other homes built onto the slope.

Figure 43 - Mino. Mr. Senda's soaking pool.

I could tell I was in the right place as I started to notice paper pulp embedded in the dirt and stone along the steps. The family dog barked at me as I approached—a mean, scared, scraggly little thing. At the top of the steps are the steaming and soaking tubs for preparing the raw materials. These tubs were about 2-meters squared, made from poured concrete painted sky blue, and next them is a large pot in which the family can boil their bark. To the right of this apparatus is a wooden, one-room hut which is larger (about 7-by-4 meters) than the one I saw in Kurotani at Mrs. Y's house, in which the paper is made. It was built in the 1950s, and the wear on the building is visible—the work done here uses water, and moss had begun to grow in parts of the floor and walls that received ample moisture.

Figure 44 - Mino. Mr. Senda stoking the fire outside his vat room.

Figure 45 - Mino. Mr. Senda's moss-covered rakushuishi apparatus.

Mr. Senda works in his vat room making sheets of paper, including a special kind called *rakusuishi* (落水紙), which is a style of paper that is punctuated by small, soft holes of varying sizes. Rakusuishi is made by first scooping and forming fibers into a sheet of paper and then laying it on a screen. Then the papermaker turns a spigot, and water showers from a horizontally-laid, punctured pipe above the sheet. The drops of water that come from the shower leave round marks and holes on the sheet in a random pattern, so no two sheets are the same. This technique can be used to embed watermarks or overall patterns into the paper, as well.

Figure 46 - Mino. A kamiko shirt made from rakusuishi.

The Senda home also acts as a shop, as the front facade of house is all glass sliding doors, which can be opened to welcome customers. Inside are various paper artifacts and drawers that hold their paper. Mino has is a kumiai, but it does not deal with the sales or PR for local papermakers, because the industry remains robust enough that they have not needed to band together yet, although there are generous public papermaking facilities run by the kumiai.

Tucked in behind the family's house/shop is another small, old building, and this is where the paper is dried. Though traditionally washi paper would be dried on wooden planks in the sun, this family has the luxury of owning drying machines—

large, vertical metal structures that use a vacuum system to keep the paper stuck to them, and heat to dry the sheets. This process is what gives sheets of paper its front and back: the surface of the sheet the connects with the metal is considered the back, and comes out much smoother than the other side.

In the Senda family, the paper is made by the husband, and the wife does the work of drying, sorting, and selling. He has an apprentice, who lives with them in their home and with whom they share the work of raw material processing. Mr. Senda is not from the local community where he lives now—he is from a neighboring town roughly 40 minutes away by car. "Everyone here has the same last name," he says, "everyone is related by blood." This is common in rural papermaking communities. Because the skills for pulling sheets of paper from vats was traditionally passed between generations of women, households would lose their means of production—or at least, their unique variety of paper—if women left home after marriage, so marrying within the village was beneficial.

Mr. Senda became a papermaker by chance. He was working at a paper museum, and one day was offered a papermaking job by a local papermaker. After apprenticing for three years, his teacher decided to retire and move, and since his own children did not want to carry on the business, he offered to sell Senda the entire home and business, although he still lives nearby and comes to offer help and advice from time to time. In 2011, Mr. Senda bought the home and studio, which came

complete with a papermaking studio and material preparation facilities. Mr. Senda and his family have been at the house making paper since then, and if the business can survive, they will continue to produce washi.

Figure 47 - Mino. The Senda family dog.

The Senda family produces enough paper to make a living in a rural Japanese town where daily life items are relatively affordable, but they do not live luxuriously. The three papermakers that I spoke to in Kurotani told me the same thing: they don't make a lot of money, but make enough to live (their average monthly incomes were roughly ¥150,000) in the countryside where the cost of living is lower than in the city. I spoke with several papermakers who were drawn to the idea of taking a risk or experiencing a different—i.e., more rural and communal—way of life. Mr. Senda was

looking for what he should do with his life, and tried to find it working in pubs in London, traveling South America with a Shaman, and eventually coming back to Japan and working in Mino. He was running from something: "I wanted a life that wasn't the same as my parents, [who are] a banker and a public servant." Through these experiences abroad his desire grew to do something "connected to veganism," and live in the mountains. The life of a papermaker, which involves being part of a tight-knit local community, working with natural materials, and living in the mountains appealed to him. The lack of job security did not deter him—one of Mr. Senda's motivations was to become part of a community that shared his values about nature and crafts: "I wanted to make a village," he says.

These washi makers are operating proportionally through small-scale engagements with local ecologies. Traditionally, papermakers grew their own raw materials in a plot of land or in-between their primary crops. The roots of the kōzo tree are rhizomatic and are useful for strengthening hillsides against degradation and, potentially, landslides. Besides growing it themselves, papermakers may have also used wild trees growing in nearby mountains—gampi can still only be sourced in the wild. The Senda family, however, does not grow any of their raw materials.

Traditional papermakers had free access to raw materials on the basis of what political economist Elinor Ostrom (1990) calls "the commons." This theory deals with the extraction relationship between local actors and natural systems and relies on all

actors involved not overusing resources to allow all members of a community continued access to a source of raw materials. The rhetoric surrounding this system of resource management has been contested for quite some time—Hardin (1968) says that the system itself relies on human decency and trust, and without regulation and the privatization of property, the commons can be abused and therefore doesn't work. Ostrom (1990) believes that a common-pool resource system can work through oversight and regulation, but Hardin (1968) argues that a "it requires a fundamental extension in morality," which means that local stewardship and oversight is vital in maintaining resources.

Cultivation of the raw materials for papermaking has moved farther away from the papermakers field of vision in recent decades. Kōzo is the most common material used for making washi as mitsumata has too many small branches and flowers which make it difficult to peel, and gampi cannot be cultivated. Throughout the course of my fieldwork, I asked papermakers how they source their kōzo. There were two common answers: either makers source materials locally or they do not. Those in the first group indicated they were sourcing materials in the same way it was done in the past: papermakers would have found materials nearby, wild from the forests or the fields near their homes, or cultivated it themselves on a local plot or in-between their other crops. Those in the second group indicated they were responding to contemporary pressures: these papermakers do not have the time or resources to

grow it themselves, and rarely do farming simultaneously with papermaking, so they buy the raw materials from elsewhere—domestic or imported. Imported kōzo comes mainly from Thailand and the Philippines, where the climate permits the same species of Japanese kōzo tree to grow, but due to the difference in climate, it grows much larger and thicker, and thus the fibers it produces are slightly larger and less flexible.

Figure 48 - Tosa. Koso growing at the Kurīn Aguri plot.

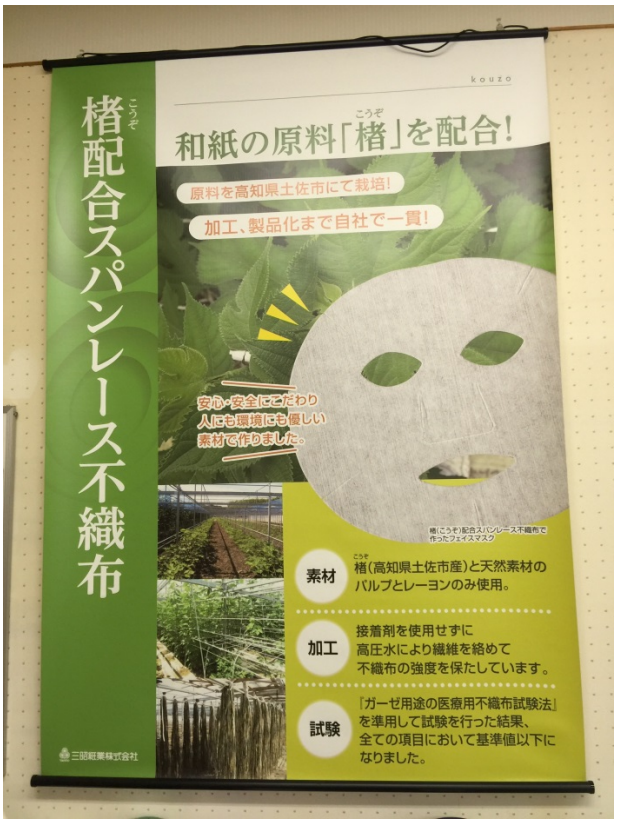

Figure 49 - Tosa. Kozo is used for one product line at the Sansho paper company.

Domestically sourced kōzo comes from the two large kōzo producing regions in Japan: Tosa, in Kōchi Prefecture, and Nasu, in Tochigi Prefecture. I visited the former, as I was informed by members of the Society for the Study of Washi that they

had a thriving communal workspace and lively research and testing facilities as well as an industry of kōzo production.

In Tosa, the Sansho Paper company, which makes machine-made paper for various domestic uses, is growing a small field of kōzo directly behind its Tosa factory. The factory is a 30-minute drive from Ino Town, and it produces nonwoven paper-like consumer products including facemasks, wallpaper, fans, packaging, disposable baby wipes, and beauty products, among other things. The company began in 1962 as a maker of *shōji* (paper used for sliding doors in Japanese-style homes). Here, on one hectare of land, is a small facility called Kurīn Aguri, where extremely tall kōzo trees are raised. Four full-time employees are tasked with maintaining and harvesting the crop.

Kōzo normally grows to a height of about three meters, and sends 10-20 branches on average out from a central bulb. Taller trees, growing to around 5 meters, can be grown here because workers remove most of the smaller and weaker branches and allow growth in only 3-5 branches. By doing so, the trees put all of their effort into producing these branches, and they become very tall. According to the staff in the facility, this does give a longer, less fine fiber, but increases the efficiency of production in that there are less branches to cut, which means less work at the harvesting and processing stages. The branches are also much wider and longer than those grown using conventional methods, so there is more yield. Due to the size of these branches, they have had to develop their own steaming drums and peeling machines, as the branches are unwieldy for hand-peeling, and cutting them in half would defeat the purpose of growing them so long. The production system they use is circular, meaning they either burn or compost all the wood and unusable biomatter parts each year and use this for fertilizer the next year.

Figure 50 - Tosa. The custom-built steaming drum.

Figure 51 - Tosa. Pruning the branches requires special machinery.

This field does not supply the needs of the factory's other products, and even by the admission of the manager of the staff members at Kurīn Aguri, growing kōzo is a "hobby" of the owner of the company. This private kōzo field provides the raw materials for only one small line of products which are marketed to promote the fact that the raw materials are locally-grown, and the graphic design suggests inspiration from traditional Japanese motifs. The inference is that the owner wishes to promote his city's history—a history tangled together with washi-making—even though his company makes some of the products that essentially replaced handmade washi in many daily uses: facemasks, wallpaper, packaging, lighting, for example.

3.6.8 The Hamada Family

The wider papermaking region in southern Kōchi Prefecture, known as Tosa, is separated into two areas: Tosa City and Ino Town. Tosa City is where you will find most of the larger papermaking companies, like the Sansho Paper Company. Ino Town is a much older municipality and is nestled between the wide and sprawling Nyodogawa River and the surrounding mountains and hills, covered in a lush assortment of Japanese pine, banana trees, and bamboo. Ino town is known for its once-robust industry that produced a kind of typewriter paper called Tengu-jōshi. Kōchi Prefecture is in the south of Shikoku, a large island in Japan's Seto Inland Sea. The climate here is humid and creates a flow of warm air throughout region, which ensures that for much of the year—from spring to autumn—the villages and towns are full of the lush foliage of subtropical vegetation. The climatic conditions here make Tosa perfect for kōzo cultivation.

Figure 52 - Tosa. The Nyodogawa River.

In October 2016, I met with Mrs. Hamada, the daughter-in-law of a well-known papermaker and former Living National Treasure, Hamada Sajio, who passed away shortly after our interview took place. Their family name is synonymous with washi-making in Ino Town. She was not born into the papermaking family, but married a man who did not want to take over his father's business. "My two sons make paper now, so it skipped a generation, but it continues," she tells me. Hamada herself does not make paper; instead, she dyes it by applying synthetic inks to the paper in inconsistent amounts to create cloud-like shapes on the page. These dyed sheets are used for a kind of collage drawing using ripped paper of different colors called "chigiri-e" or "rip drawings" in English. Until she began this work, the demand was almost completely gone for tengu-jōshi, the typewriter paper that Tosa, and her family, is well-known for making. It was produced in such small quantities that "it

would have been natural to stop operations completely," she says. The local industry was revived when a distributor asked her to make another kind of paper for chigiri-e. Today she has a small number of buyers, and she lives a modest life similar to the other papermakers that I spoke to.

Figure 53 - Tosa. The CMPF. The small, white shack in the far left behind the concrete *sarashi* pool is where Hamada does her work.

I visited her paper dying studio—a shack on the premises of the communal material preparation facility (共同原料処理場, *kyōdōgenryōshorijo*, Communal Material Processing Facility [CMPF]). The facility is located in a small farming village 20 minutes by car from Ino Town train station. Hamada is the only person who uses this facility full-time, but some other families—"one or two," says Hamada—also use it to prepare their raw materials. The rest of the papermakers use the two nearby government-run facilities: the Testing Center in the center of town, or the hotel and training center along the Nyodogawa River called Quraud.

There are three buildings on the premises of the CMPF, as well as a large concrete pool used for the sarashi step of the material preparation process, where the strips of bark are laid in water to bleach in the sun before being beaten. This pool is filled via a constantly-flowing pipe which redirects a natural mountain stream through the facility on its way down to the Nyodogawa River. One of the three buildings contains the mixing pools used specifically for the paper that once made this region famous—Tengujōshi. This paper was exported in large amounts to America, where it was used as typewriter paper, as it was extremely thin and durable—it was lithe enough to move through the machine and yet also be strong enough to be pulled and tugged without tearing. Hamada's family became papermakers during period when this type of paper was being exported to the United States, and they exclusively made this paper. In the accounting logbooks I noticed that the operating costs and the number of people who used the facilities have taken a severe downturn since the 1980s, and have not recovered.

Figure 54 - Tosa. Mrs. Hamada's chigiri-e paper.

Figure 55 - Tosa. Mrs. Hamada hanging her dyed sheets of paper.

The tools in the facility are old, and Hamada does not know when and by whom they were made. There is no documentation on the premises that shows when the building was constructed. She tells me that the understanding of the locals is that the site was originally built by the owners of a local papermaking factory for those papermakers working in the local cottage industry to have access to tools and facilities. They would work in this space and then sell their paper to the company who opened the facility—similar business practices were also seen in Kurotani and Mino. The land on which the site is built is currently owned by a local Shinto shrine, and for legal reasons cannot be passed to the locals who currently use and maintain the buildings.

These locals collect money every year to hold small religious festivals on the site and to fund the upkeep of the buildings.

Hamada does her work in a small shack in the northern corner of the CMPF. To call this a "facility," may conjure images of concrete walls and procedural formalism in the space and its tools—there is a separate, government-run facility, the Testing Center, in Tosa that is closer to this image—but that is not the case here. It is wild: the humid southern climate is suitable for the banana trees and Japanese pine that grow in abundance clustered around the buildings. While I speak to Hamada I sit on a small stool in front of her workbench, surrounded by hundreds of bottles of dye in different colors, mixed to the correct ratios. Dye covers the table, floors, walls, windows—every surface has specks of paint and today she is dying her sheets of paper a bright red, so red splatters the floor. Sheets of paper are hung individually with laundry clips and occupy every open space in every building. Next to her on a shelf are the old books and records that have been in this facility since it opened, and that she has never looked at in the 14 years she has been working here.

The paper she makes today is made by her sons, painstakingly dyed by hand in her shack, then packaged, shipped, purchased, and torn up to create impressionistic assemblage drawings by people across Japan, most of whom are elderly, according to Hamada. "I may not have any (customers) in a few years," she says.

A key concern and motivation for papermakers and community organizers has been finding new uses for handmade paper. One difficulty is that washi is so entrenched in a system of cultural value formation which places a high value on tradition, and handmade products—the burden of history and tradition may make it difficult for traditional handmade paper or papermaking practices to be objectively compared in relation to other consumer products, but the important aspect of this research is to look at the social and technical nature of the paper, not the economic impact.

The wildness of the communal material processing facility in Ino Town, and the papermakers using the local mountainsides to source their raw materials—living off the land—may contribute to a romantic ideal of countryside living that demands some reflexivity. The terms *furusato* (literally "old village") and *satoyama* (literally "village mountain") are used to describe these idyllic visions of humans living with nature in the Japanese countryside. Knight (2010) identified that s*atoyama* as a popular term entered usage in postwar Japan, and has recently been used by the government to promote a sustainable way of living with nature as an essential part of Japan's cultural history.

As with sustainability and perhaps many notions of a techno-social solution to problems as the environment, "satoyama" has no simple agreed-upon definition. Knight (2010, 421) defines satoyama as a "sphere of 'encultured' nature that has traditionally existed on the periphery of rural settlements, but which is increasingly threatened by industrialization, urban development, rural depopulation and changing lifestyles." Satoyama can be seen all over the Japanese countryside in farming and craft communities who rely on common access to locally-sourced food, fertilizer, and other materials that can be found in the surrounding

forests, woodlands, rivers, and fields in the landscape. In these places, the forest has been cut back, and a "secondary natural environment" (Takeuchi 2010) has been formed as the product of the human relationship with the landscape. This may have once been the way of living for the papermakers in Tosa, but now Hamada does not live off the land. She resides in a neighboring city, and uses chemical dyes for her chigiri-e paper, which itself is made from mostly imported fibers.

Satoyama are the product of a relationship with humans, and careful stewardship is needed to maintain them. While the satoyama system of living with nature can be sustainable, both overuse during the Edo and Meiji Periods, as well as underuse that began in the postwar period have had damaging effects to the sustainability of the system (Takeuchi, Ichikawa and Elmqvist 2016; Takeuchi 2010). Takeuchi, Ichikawa and Elmqvist (2016, 31) frame satoyama as a "social-ecological system," and identify common-pool resource use in satoyama from a time when "people maintained a direct relationship with nature, and the landscape was integrally managed through community cooperation to avoid overuse." The authors highlight two key factors explaining the collapse of longstanding satoyama systems in rural areas: population decline and the "importation of goods from outside." Knight (2010, 421) defines satoyama as a "sphere of encultured nature that has traditionally existed on the periphery of rural settlements but is increasingly threatened by industrialization, urban development, rural depopulation, and changing lifestyles."

A satoyama is a space of negotiation with the natural landscape, and without care and maintenance the relationship breaks down and the landscape changes—species of plants that had been cultivated for food and materials grow increasingly wild and will affect the biodiversity of the area. This negotiational relationship between people and the landscape positions human beings as custodians, "responding to feedback signals in a direct way and

finding ways for people to receive nature's bounty in a sustainable manner" (Takeuchi, Ichikawa and Elmqvist 2016, 30).

A satoyama is a relationship, and washi is one of its potential products. It is shaped not only by human hands, but also the distinct characteristics of the landscape: humidity, groundwater, snow, soil, plants. While the sites visited in this study may not function as satoyama in same manner they might have in earlier generations (even one or two generations ago), each is striking a new deal with their local landscape. In Kurotani, the papermakers using the traditional facilities have begun growing raw materials locally, and in Tosa, the mountain water still travels through the papermaking studio before it continues to the ocean.

Stewardship, sustainability, and satoyama defy reduction and easy definition as they are difficult to approach with solutions. What can be seen in papermaking, however, is a creative practice in which the human and the nonhuman fit together to form a tight, interdependent bond—not in a form of direct human subjugation of the landscape, but in a negotiational relationship of care.

3.7 Chapter Conclusion

Mirzoeff (2014) points out that the planetary scale of anthropogenic climate change makes the crisis difficult to visualize. Similarly, the stakeholders, processes, effects, materials and people involved in environmental sustainability in fashion and design form a web of contingent relationships so complex that it can be intimidating to approach as a designer or producer hoping to create more appropriate products. The dominant fashion industry is also a large, complex system of material flows and people; placing the blame for bad industry practices can be difficult. With the inner workings of the industry largely obfuscated inside a

black box, environmental sustainability in the context of the dominant fashion industry can be difficult to approach for consumers, students, and even designers themselves.

Socially just and environmentally sustainable methods, which are alternative to those of the dominant fashion industry, need to be developed. This chapter showed that alternatives could be consumer-led and emerge from projects and proposals that specifically problematize the producer-consumer hierarchy. This chapter suggested that the consumer does not currently have agency over the production of fashion, and they inadvertently participate in unethical practices because of their position. To understand how consumers can reclaim their agency in the fashion industry, qualities emerging from "the third industrial revolution"—specifically collaboration, openness, transparency—were identified as potential design approaches that may return agency to the consumer through access to tools, materials, and production processes, and the potential to share and network with a community of peers and professionals. This chapter shows that these qualities are at the core of emerging interdisciplinary projects and ventures that empower consumers to ask how the three identified community-related qualities can affect the way we make and use clothing. By testing these qualities against both contemporary projects and papermaking, which is a longstanding practice, this chapter was able to show that community-based production can be multiscalar and polysemic, and could contribute to the development of alternative fashion design methods.

Papermaking in Japan is a longstanding material-making practice through which qualities of collaboration, openness, transparency can be explored in situ. Using data collected during site visits to five papermaking communities across Japan, this chapter looked at how these qualities might manifest in washi making, and through this analysis sought novel community-based production methods that could be applied to fashion. Although papermaking is environmentally sustainable in terms of access to renewable raw materials, it

is not socially or economically sustainable. Traditional papermaking exists in a precarious state due to a number of factors, including dwindling and aging rural populations, and mechanization. And, despite the financial support some regions receive from local governments, the demand for handmade paper is simply not high enough to support a large industry. Though the industry is struggling in many ways, it offers a means of investigating pre-modern examples of the core qualities discussed in this chapter. These are visible in papermaking in ways that may not be as apparent in contemporary consumer-led strategies.

This chapter presented a review of production and consumption strategies relevant to fashion that problematize the traditional roles of producer and consumer, and showed that some consumers want to make things in communities—to share, to collaborate and be part of the design process. Material-making practices that are based on local resources and collaborative production allow people to see the entire process and to take ownership of, and responsibility for, products and effects via feedback signals. Consumer-designers don't only work with materials, shapes, colors, and tools—they design new ways of living, embodying, and making fashion that considers what is really at stake when designing clothing. To borrow a term from Wark (2004, 6), these designers might be considered a "hacker class" who "produces the possibility [...] of making something of and with the world." What does "making something of and with the world" mean for the production or material or form? In the next chapter, this question was explored in terms of current art, design, and papermaking practices to understand the processes and products of a creative community that includes nonhuman partners—processes and products made through interspecies collaboration.

Chapter 4 – Growing Fashion Through Relationships with Nature

Aim of Chapter

How can fashion be designed and made in extended communities that include nonhuman organisms? This chapter addresses this question—RQ 2—to further consider the main purpose of this study: How can a more socially just and environmentally sustainable alternative to the dominant fashion industry be developed through a fashion design method contingent upon local communities of human and nonhumans?

To approach RQ2, the theory and practice of interspecies collaborative art and design will be explored by first problematizing the dualist worldview, and then suggesting that the phenomenon of emergence could be the core vehicle for interspecies collaboration. The question will then be directed to papermaking, as well as the burgeoning practices of "Bioart" or "Biodesign" (Clotmag, 2017; Iwasaki, 2015; Myers, 2015, 2014), in which nonhuman organisms are studied, manipulated, created, employed, or partnered with to make work.

The primary papermaking example explored in this chapter is the paper clothing culture in Shiroishi, Miyagi Prefecture. This fieldwork has been focused on here because it offers insights into local distinction and how this manifests in a material that is the product of its region and the community of humans and nonhumans who made it. Such a material is distinct from, yet builds on examples provided in chapter 3 because it extends the notion of community to include nonhumans: soil, plants, bacteria, and animals. While chapter 3 concerned the key qualities of community-based production, the aim of this chapter is to reflect on ways of making that problematize the human-nature hierarchy, in order to develop perspectives on material making in extended communities that include nonhuman organisms—in other words, negotiating new ways of designing *with* Earth, rather than *of* it,

and exploring ways that emergence can be a vehicle for design. This aim will be explored by asking the following question: can nurturing and forming, as opposed to extracting and processing, inform a method for making fashion?

4.1 Introduction

Human action, in the form of agriculture, industrialization and, especially, globalization, has significantly altered the natural systems of the planet, and has potentially ushered us into a new geological age: the Anthropocene. The longstanding Cartesian dualistic worldview, where the world of humans is distinct from the world of nature and animals, is being problematized and challenged by a more integrated view of humans as being *of* the world, rather than just *in* it. Especially in light of anthropogenic climate change, as the distinctions between what is manmade and nature are eroded, the boundary between us and the smooth, clean surfaces of our design objects is shifting, and humans are coming to be seen as fully-integrated parts—or holons, to borrow from Koestler (1967)—of the Earth's natural systems.

Designers looking for solutions to unjust and environmentally unsustainable making practices can begin by reframing their own relationships with nature, and asking the question: What kind of hierarchical relationship does fashion have with nonhuman organisms, and how can this be recast? The answer could lead to the development of design methodologies in which the autopoiesis of the nonhuman is recognized, and collaborative, or sympoietic, ways of making can be achieved. This chapter seeks to determine how Japanese paper clothing culture can help to identify these negotiational processes of nurture and exchange, or "making-in-growing," and "growing-in-making" (Ingold and Hallam 2016, 5).

An exploration of the longstanding cultural separation between humans and nature helps to understand the lineage of the argument for the agency of the nonhuman. Feminist

ecocritic Donna Haraway (2007, 15) calls these nonhuman organisms "companion species," and she includes "such organic beings as rice, bees, tulips, and intestinal flora" in her definition of the creatures who "make life for humans what it is—and vice versa." Similarly, environmental theorist Timothy Morton (2007, 2) identifies the nonhuman as "animals, plants, and the weather." Nonhuman creatures or organisms are active in the formation of material and form, and the phenomenon of emergence—how the maker, the kōzo tree, and the landscape converge to produce material and form—will be outlined in this chapter to help understand that process. In the context of anthropogenic climate change, Tsing and Kirksey draw attention to the notion of emergence in the aftermath of "blasted landscapes" (Tsing 2015) affected by human action. Their research may offer a stepping stone in connecting early studies into animal agency to methods for interspecies collaborative art and design, through creative methods that employ emergence as a tool, or vehicle. The questions that result from the growing awareness of nonhuman agency and subjectivity in the face of environmental change offer new perspectives in artistic and design research. This research could open new pathways toward collaborative practices which cross the species divide.

The species divide is a result of long and slow changes that emerge from evolutionary systems of development which have formed our global ecology—a constantly-moving system[43] of deeply intertwined and contingent parts. Contingency in this sense can be understood through the lens of Næss's (1979) "relational or total-field image."

Previous chapters outlined the difficulty of tracing items made by the fashion system back to their source, and suggested that these items might be appropriately viewed through a technological lens by considering them as "black boxes," where the mechanisms that generated them—materials, labor and other lines of energy—are hidden behind smooth surfaces. The current chapter presents a framework for making materials and forms for

[43] This system has been described in many ways, including a "mesh" (Morton 2010).

fashion items that embraces rather than obfuscates placeness by working closely within a local ecology of human and nonhuman actors. Such an approach might address unjust and ecologically unsustainable production strategies in the current fashion system. To do so, the chapter positions Japan's handmade paper fashion traditions within discussions of placeness and localism. The paper clothing makers that will be used as a case study give real-world examples to the possibility of developing such a framework. In these examples, the possibility of making is contingent upon makers who leverage their embedded position within a local landscape and an extended community. Such a position, it will be argued, constitutes an adversarial fashion practice—challenging the global scale, standardization, exploitation and unsustainable qualities of the dominant fashion industry. The place-making in Japanese papermaking is a phenomenon which links human beings to their communities and their natural surroundings in a tight, reciprocal entanglement. Stengers identifies such exchanges as "relations of reciprocal capture" (2010, 35), which is important in this dissertation as it evades conventional definitions of stewardship and instead may favor a non-hierarchical stance in regard to the care and nurture of nonhuman partners.

4.1.1 Paper Clothing

This chapter suggests that sustainable fashion strategies could potentially find models in longstanding papermaking practices—which bridge technological and social innovation—at the margins of contemporary centers of cultural production. Papermaking is used as a tool to examine the core concepts this study, and this chapter will look at paper clothing specifically. This section will provide a brief introduction to the history and context of paper clothing in the West and in Japan, to understand how its various use and production methods can be understood in the context of localism and placeness.

During the Edo Period (1603-1868), washi was used for many things in the home. It was even used for clothing, called *kamiko* or *shifu* (Tsujiai 1966; Natsumi 1980; Katakura 1988). While paper seems like an unlikely material for clothing, it can be treated to become strong and durable. Around 910 CE, Buddhist monks in Japan began pasting their sutras—written on washi—together, and created a lasting culture of wearing paper clothing (Omura 1997).

While the previous chapter focuses on community structures and access to tools involved in making washi, this chapter will specifically look at paper clothing traditions. Data for this chapter was collected with papermakers in Shiroishi—a small town in Miyagi Prefecture. Shiroishi's paper clothing history and current state of paper clothing and paper production will be discussed to explore how a landscape can intersect with a critical practice of making, or how a material or form might be grown. The former will be discussed in the context of Relph's (1976) "placeness and placelessness" in tandem with Frampton's (1983) "critical regionalism"; the latter will be discussed using Ingold and Hallam's (2016) concept of making-in-growing, along with Oxman's (2010) concept of material ecology.

To develop a perspective on interspecies collaboration and to understand how these theories can be expressed in a material-making practice, papermakers and paper clothing from Shiroishi is considered from a historical and contemporary perspective. In order to frame this material-making culture as an adversarial fashion practice—one which challenges the global scale and standardization of the dominant fashion industry—it is necessary to show the ways it is embedded in a local landscape and community of both human and nonhuman actors. In addition to Relph (1976) and Frampton (1983), the concept of the local expressed in paper clothing culture in Shiroishi is further considered through an examination of Japan's culture of local delicacies (*meibutsu*).

In order to answer RQ2[44], this section first asks: How are the local and community embodied in paper fashion and textiles in the Japanese context? What can we learn from a longstanding small-scale material-making system and its material flows that can contribute toward a method for sustainable fashion design?

The earliest forms of clothing were necessarily made from renewable natural material —such as grass, linen fibers or animal skins—the only available items to be found in the biological systems of local landscapes. Over time, these craft methods were refined, and they allowed people to cultivate and use locally-sourced materials in regionally specific ways, and plants and animals themselves become blended forms of technology—between being grown, nurtured and shaped by humans—that result from a relationship of local human-nonhuman negotiation. In Japan, this can be seen in folk crafts such as bamboo basket-weaving and sericulture. The possibilities for production with these "biotic technologies" are limited by the agency—the morphology and behavior—of locally sourced materials.

Thinking fashion design through these concepts is useful for reframing our relationship with "synthetic" materials that we can make, especially in the context of the Anthropocene, when the plants and animals of the planet may be marked indirectly by human action.

If we have entered a new geological age defined by man, and the boundary between nature, technology, and our bodies is blurring, what new materials and modes of consumption can be proposed for use in fashion design? In this moment of in-betweenness, changes need to take place across domains: As discussed in previous chapters, the technological and the social need to be addressed simultaneously. We are entering a time of environmental crises that impinge on the technological and social, and this provides impetus for developing new materials and methods of material making. Historically, crisis may provide the generative

[44] RQ2: How can fashion be designed and made in extended communities that include nonhuman organisms?

power for developing new materials which answer the changing needs of society and the environment.

In Germany during the World War I and II, when cotton could not be imported, researchers were sent to Japan to study papermaking techniques in hope of developing an alternative. The Germans eventually went on to develop paper textiles that were used during WWI and II, but the resulting garments were so uncomfortable that they were abandoned (Leitner 2007). As in Germany and England, resource allocation and sites of extraction, as well as funding for the research and development of new materials, are affected by political and social movements. As a response to the need for sustainable fabrics for fashion, new textile production and finishing techniques have been developed the world over (Niinimäki and Hassi 2011), but what is needed, however, are not only new materials, but a new sense of how we use and relate to them. How has our thinking about the environment opened new ways of thinking about fashion and material design? What new material and social developments will arise from the need for sustainable fashion fabrics? These are some of the larger framing questions that are investigated in this chapter, questions that seek to interrogate how environmental sustainability in fashion might come about as the result of a relationship between complex social and technological phenomena. The argument here, is that a fruitful avenue for investigation may be a consideration of the real-world example of paper-clothing making, which encompasses the social and technological through a form of interspecies design that is embedded within a local landscape.

4.1.2 Human/Nature

This section contextualizes the argument for interspecies collaboration in art and design by first introducing the historical divide between humans and animals. Before an argument can be presented for the possibility of human collaboration with a bacteria or plants,

a basic historical overview is necessary. Then, the chapter introduces a discourse that promotes a monist worldview and the agency of animals, to show that if the agential capabilities of nonhuman animals can be identified, then an argument can be made for the agential—and collaborative—potential of other, less-sophisticated organisms, such as fungi, trees, and bacteria.

Each fashion item is suspended in webs of semiotic and economic entanglements, seemingly disconnected from the natural environment. Unsold fashion items are colloquially referred to as "deadstock," which means that the "life" of a garment—an item of stock—begins at sale. If a garment isn't recycled or resold, it is destroyed or disposed of. Items of stock are seen as discrete objects, disconnected from their material and social origins. In other words, natural resources are not always materially evident as the source of many garments in contemporary fashion design. Rather, nature is represented through expressive motifs: to express youthful exuberance as floral prints on textiles, used symbolically for marketing messages, or to convey anthropomorphized sexuality in leopard print leggings. Nature exists as a nostalgic representation of a world for which we yearn, yet cannot return to because the processes of modernity have pushed it to the fringes of our daily experience (Berger, 1984).

The Western view of nature has been philosophically undergoing a process of distancing since the Enlightenment (Tsing, 2015; Morton, 2007; Ingold 2000; Berger, 1984), which has led to the distancing that consumers experience in relation to the sites and materials of fashion. The Enlightenment project paved the way for modernity which continued the narrative of progress and colonization of nature, the source for commodities and resources. René Descartes's (1596-1650) canonical and reductive statement "*Cogito ergo sum,*" or "I think, therefore I am" disallows animals the privilege of thought and, therefore, existence, and placed human beings at the helm of the planet. Cartesian duality imagines a

mechanistic nonhuman world, devoid of spirit and will, and though this separation of humans and nature defined us as a species, the fallout of the Anthropocene may be evidence that human primacy is not an ideal means of planetary stewardship.

The publication of Carl Linnaeus's (1707-1778) *Systema Naturae* in 1735 exemplified the Enlightenment project of cataloging living things. The Linnean compartmental hierarchy of biotic life had a twofold effect: first, allowing people to see the similarity and, therefore, connectivity of plants and animals; and second, to subjugate these nonhumans by subsuming them into the human sciences. Following Linnaeus and Lamarck (1744-1829), who classified the invertebrates in 1801, is Ernst Haeckel (1834-1919). His well-known renderings of the creatures of the sea, land and sky show them as distinct elements of a landscape, removed from their physical entanglements. Haeckel's creatures appear to languish in the frame as posed units of beauty. His drawings and the work of his predecessors lack the violence and complexity of the world they sought to understand. The work of these canonical naturalists succeeded in making human beings aware of the vast array of living things in the environment. Simultaneously, the domain of these creatures was established as the *environment*—they *surround* humans, but are not necessarily visible as part of our lives.

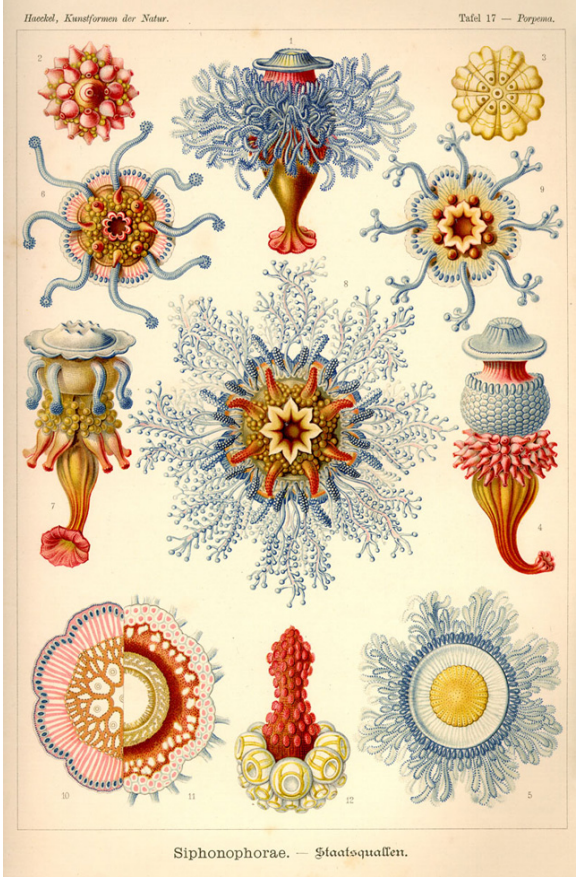

Figure 56 - Ernst Haeckel. “Siphonophorae.” Image: http://biolib.de.

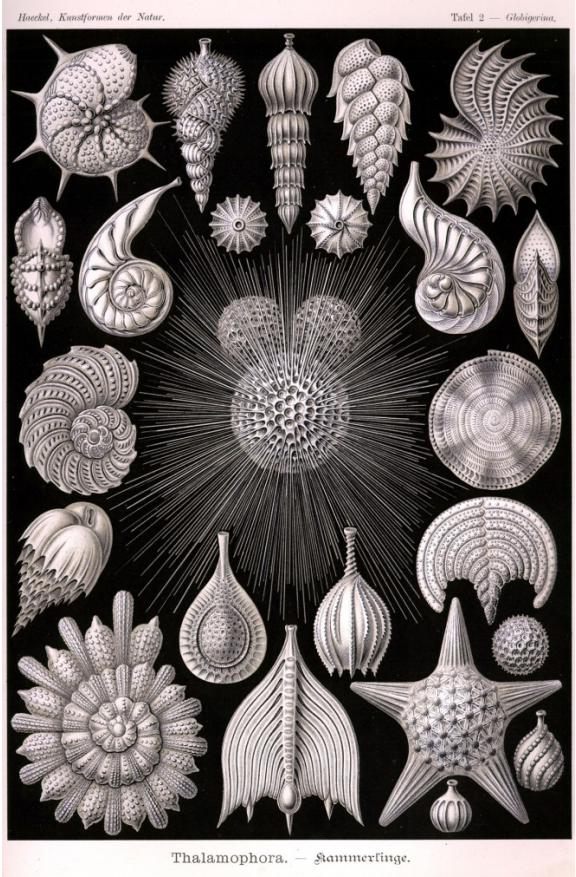

Figure 57- Ernst Haeckel. “Thalamorpha.” Image: http://biolib.de.

The environment—inhabited by all manner of nonhumans—has been made less visible (perhaps even invisible) by modernity: it is memorialized in zoos and represented by aesthetic design tropes. At the turn of the 19th century, as undomesticated animals moved further away from everyday life in urban environments, the environmentally damaging processes of industrialization, especially in commercial textile and fashion design, took shape. As nature was dominated, exploited and pushed out of cities, its representations changed too: realist images were replaced by abstract expression in painting, and animal forms began to appear in children’s toys and on floral print wallpaper and dresses (Berger, 1984). If the zoo is a monument to the invisibility of wild animals in modernity, then the shopping mall and grocery store are testament to the invisibility of wild plants and bacteria in the processes of material making which anchor us to the Earth (Pollan, 2006).

Building on Biblical notions of creation and human primacy, the thinking of Linnaeus and his contemporaries widened the split between humans and nature—where humans occupied a distinct category of being at the top of the hierarchy of things that inhabited the Earth—that remained stubbornly in place until recently. There has been a great deal of research in the 21st century, that will be outlined below, dealing with how to repair the rift between the human world and that of the nonhuman, and this research exemplifies a turn away from the modernist tendency to valorize human progress through the subjugation of nature. In this section, I will show how the previously stated problem of anthropocentrism and the human/nature divide can be addressed via the argument for the agential potential of animals and other beings.

John Berger (1984), in his essay "*Why Look at Animals?*," hypothesizes that the shift away from nature may have begun as far back as pre-history, when animal husbandry and agriculture began. Berger continues by claiming that what distinguishes humans from animals is our ability to have "symbolic thought." Ironic then, that our first symbols were of the animals, and likely painted in their blood. Ingold (2000, 61) and Lippit (2000) point out that while Cartesian dualism was necessary at one point in history to "see" humankind as different from their its animal origins, the divide has created a barrier between humans and nature, and because of this we suffer spiritually. This split, where humans have God-ordained "dominion over the fish … birds … livestock and over all the earth" (Genesis 1:26) has more than spiritual ramifications, as it allows humans the privilege of primacy, and therefore the perceived right to extract resources and displace nonhuman organisms. This misunderstanding of the human's position in the planet could have led us into to the Anthropocene.

Some of the earliest efforts in the sciences to repair this rift were from marine biologists such as John C. Lilly, who attempted (while using ethically dubious methods, such as administering LSD to his dolphin subjects) to teach dolphins how to speak English (Lilly 1969). His attempts at communication using English words were unsuccessful, but they yielded results in understanding non-verbal and non-anthropomorphized communication. His work was pivotal in building the argument for the existence of a kinship between human and animals that is not solely based on anthropomorphization—that we can have a relationship in which we let an animal be an animal without placing on it human expectations for behavior or communication. In a similar vein, the work of psychologist and animal rights activist Gay A. Bradshaw, addressing elephants with Post-Traumatic Stress Disorder, has also advanced the contemporary thinking of animals as possessing of intellect and complex psychological faculties (Bradshaw 2010). Both Lilly and Bradshaw have explored the concept of panpsychism, the idea that all living things possess a mind, or mind-like qualities. Their research shows that animals possess capacity for thought and societal arrangement (Bradshaw 2010) far beyond the limitations of Cartesian mechanics.

In addition to these foundational studies conducted in the natural sciences, research has been completed on the consciousness and agency of animals in other fields, including, for example, visual culture (Berger 1984), artistic research (Jevbratt 2006), conservation studies (Kirksey 2015), art history (Fudge 2002), history of science (Haraway 2002). These studies ask, with Claude Lévi-Strauss, how we can think with animals (1966) and, with Donna Haraway, how we can live with animals (2015, 5).

The argument for animal consciousness and agency has taken a long time to take root in the non-indigenous, capitalist cultures of the Global North. However, considering animals and other nonhuman entities as having equal agential potential to human beings is in line with longstanding practices of Japanese animism. The indigenous Japanese quasi-religion of

Shinto features numerous animistic rites that recognize the spiritual agency—*kami*—residing in all organic and inorganic matter. Shinto is difficult to categorize, as it exists in diverse forms, has no specific all-encompassing doctrine. It is deeply embedded into Japanese life, but it is difficult to count how many people ascribe to Shinto as a belief system. Precisely because of its pervasiveness, the performance of Shinto rites can often blend into common activities, such as opening a new business, or ringing in the new year. A thorough historical and contextual overview of the spiritual beliefs and practices of Shinto is outside the purview of this study; however, the concept of kami should be introduced to clarify relationships between humans and landscapes in Japan. Kami can refer to god or gods, who reside in over 80,000 (Statistics Japan 2013) Shinto shrines scattered around Japan called *jinja*, some of which have existed since prehistory (Breen and Teeuwen 2010, 20). Japanese ethnographer Yanagita Kunio (1875-1962) stressed the importance and value of maintaining these locally-distinct Shinto traditions rather than uniting them all under one central ideology, as each shrine has local worshipping rituals, as well as kami—local gods—residing in their neighborhood shrine (Breen and Teeuwen 2010, 6). The term kami can also refer to the spiritual energy in all matter, from elements in the landscape to weather phenomena. According to Senda (2014, 1), Shinto teaches that the "environment" is felt as a bodily experience of connectivity—a "primitive feeling [which] opens up a window to reach out to the universe" and at the core of this form of animism is knowledge that "each of us is a part of that universe, and the landscape breathes with life" (2014, 3).

Figure 58 - Echizen. Ōtaki Jinja, the home of Kamikawagozen, the resident goddess of washi paper.

In Shinto, the idea of placeness exists as an understanding that human beings live enmeshed with the landscape and its inhabitants (Senda 2013). In opposition to the Cartesian view of nature as a mechanism occupying a distant space in our imagination, one that is separated from humans by various cultural, societal, philosophical, and religious boundaries, nature in Japan has traditionally been seen as inseparable from the human. In this worldview, organisms, plants, people, and stones are connected to each other and to their local landscape through latent agency; an object's agential potential is not necessarily generated only by human action. In other words, a stone carries within it a certain capacity, which is not dependent on human definition or action. They do not possess consciousness, but this worldview provides a glimpse into a blurry way of seeing the world without such distinct boundaries as

"human" or "nature," and which contribute to the understanding of how we can bestow agency or rights onto nonhuman organisms and even ecosystems.

Recently, the governments of Bolivia, India and New Zealand bestowed a provisional "humanhood" onto certain landscapes and nonhumans. On Earth Day in 2010, the government of Bolivia passed a law called "Universal Declaration of the Rights of Mother Earth," which considers everyone on the planet as part of an "indivisible, living community of interrelated and interdependent beings with a common destiny" (GAFTRON 2018). Dolphins in India (Palermo, 2015), glaciers, lakes and forests in the Himalayas (The Japan Times, 2017), and a river in New Zealand (Palin, 2017) have also been granted rights as "nonhuman persons," "person status," and "legal persons," respectively. These decisions seem to provide evidence of institutional recognition of the agency—albeit anthropomorphized—of nonhuman members of the global ecology. Now that the boundaries are blurred and the hierarchical relationship between humans and nature has been shown to be destabilized in certain parts of the world, how can this contribute to the development of interspecies fashion design?

4.2 Emergence as a Vehicle for Interspecies Collaborative Design

This section outlines the phenomenon of emergence, and posits that it is a vehicle for creative production in interspecies collaboration in art and design. This position will be based on Ingold and Hallam's (2016) concept of making-in-growing, and Oxman's (2010) method for material design called Material Ecology.

The Enlightenment notion of dualism, coupled with the modernist desire for limitless progress has engendered a view of nature as an unlimited resource for extraction. This view has dominated the fashion production system in the 20th century and may have contributed significantly to widespread environmental damage and global climate change. Despite the predisposition of academics to show our world as being in an unstoppable state of decay due to human actions, there is hope hidden in their stories. Anthropologist Eben Kirksey has devoted his attention to the flourishing of life in the aftermath of ecological disasters, and in the ruins of industrial wastelands. He calls what he finds in these violently changed landscapes "novel ecosystems." These soft "entanglements" are masses of contingencies tangling humans together with nonhumans in such complexity that new "lifeways" emerge (2015, 218). Tsing (2015) and Kirksey (2015) suggest that members of the global ecology are not only those beings who have slowly formed over time through evolutionary processes to coexist in entangled clusters, but also new organisms that are emerging through through anthropogenic changes in a landscape: the acidification of oceans, destruction of natural habitats, or irradiated landscapes. Tsing and Kirksey draw attention to the notion of emergence in the aftermath of "blasted landscapes" (Tsing 2015), and offer a stepping stone in connecting early research into animal agency to methods for interspecies collaborative art and design, through creative methods that employ emergence as a tool or vehicle.

Emergence is a phenomenon that can be seen when "emergent entities (properties or substances) 'arise' out of more fundamental entities and yet are 'novel' or 'irreducible' with respect to them" (O'Connor and Wong 2015). Emergent entities can be seen in many places and at many scales: A snowflake is shaped by concurrent forces of energy acting upon it; consciousness is sometimes said to be an emergent property of the electrical and biological impulses of the brain (O'Connor and Wong 2015). A robust corpus of research deals with emergence in many fields, including its expressions in developmental biology, physical

chemistry, and mathematics (Hensel et al. 2004). Emergence is useful in this study to help conceptualize the methods and products of interspecies collaboration. It can be a fundamental means for making when engaging in interspecies collaboration.

Making can be growing (Ingold and Hallam 2016), and the two processes are embedded within one another when humans use nature to make. Emergence is at the core of making-in-growing and growing-in-making (Ingold and Hallam 2016, 5), in that human and nonhuman organisms exert their energies to produce form or material. The result of this collaboration is the product of this exerted energy—in the case of a sheet of paper, at what stage does "making" occur? The paper emerges from the reactive and negotiational acts of nurturing, growing and forming. Ingold and Hallam (2016, 4) comment that "the maker effects an ontological transformation in the material, not through the application of exterior force to inert substance, but through intervening in a play of forces and relations both internal and external to the things under production." However, in an interspecies collaboration, perhaps *both* the human and nonhuman actors become "maker," engaged in what Fisch (2017, 24) calls a "dynamic dialogue." This is one of the processes for making creative work *with* other entities, rather than *through* or *of* them, and could promote a method for *growing*, *together*, rather than a top-down hierarchical process of material extraction and processing, which is the conventional method of making material and form for fashion. To clarify, "making *through* or *of*," in this case denotes the process of extracting chemical or material products from the earth and its organisms—fibers for some natural textiles, petroleum for some synthetic textiles—and then processing them according to a set of standards. "Making with," or "growing, together," on the other hand, denotes a process of making materials or form that allows and even encourages the material itself—chemically, behaviorally, physically—to assert itself in the process of making. In other words, can *nurturing and forming* be an alternative to *extracting and processing* as a method for fashion design?

In the case of a recent mycelium lamp project from New York-based firm Ecovative, consumers/users grow the design object at home using molds and spores provided by the company. The humidity of the home the lamp was grow in, and the care given to it by the user are both evident in the final product. The process of making is more akin to nurturing, negotiating, and growing rather than extracting and processing. The products of smaller systems of material engagement, such as this mycelium lamp, are contingent on the local landscape. Ingold elucidates the integrated relationship between people and their landscapes when making things:

> Now the idea that in the manufacture of objects like houses, baskets and canoes, people 'weave the world', is entirely in keeping with the argument I have developed in this chapter—namely that making should be regarded as a way of weaving, and not vice versa. [...] I mean to suggest [...] that the forms of objects are not imposed from above but grow from the mutual involvement of people and materials in an environment. The surface of nature is thus an illusion: we work from within the world, not upon it. There are surfaces of course, but these divide states of matter, not matter from mind. And they emerge within the form-generating process, rather than pre-existing as a condition for it. (2000 in Lange-Berndt 2015, 165)

Here Ingold visualizes the world as a complex weave, and this act of weaving is at the core of all engagement with the matter of the world—human or otherwise. Both humans and nonhumans have the capability to generate form, and a method for making material and form for fashion could emerge from a relationship between human designers/makers and nonhuman partners.

Emergence in the context of this dissertation is a force or process that can be utilized when creating novel methods for the production and consumption of fashion items, and is at the core of interspecies creative engagement. Architectural theorists Hensel et al. (2010, 2004) and Oxman (2013) have developed digital methods to understand how emergent structures and patterns in the morphogenesis—the autopoietic ability to make form—of living things can be digitally mapped, and can provide the basis for a new paradigm of making. But a distinction needs to be made between the work of Hensel et al. and Oxman, and that of

Janine Benyus, whose well-known study of biomimicry (1997) identifies that there are systems in nature, emulated using technology, that provide elegant solutions to human needs and don't damage the environment. Benyus's work was predicted by Papanek (1971, 187), who posited that designers need to adopt a "bionic" approach, and proposed these basic tenets for his utopian (and sometimes fantastical) approach to designing with nature:

> 1. That the design of products and environments, on or off earth, must be accomplished through interdisciplinary teams, until such time as sleep-learning telepathy or the extension of the human life span make it possible and practical for the designer-planner to be conversant with all parameters of the problem.
> 2. That biology, bionics, and related fields offer the greatest area for creative new insight by the designer.
> 3. That the design of a single product unrelated to its sociological, psychological, cityspace surroundings is no longer possible or desirable. Therefore, the designer must find analogues, using not only bionics but biological systems design approaches culled from the fields of ecology and ethology. (1971, 187)

Papanek was aware that designers may not possess the knowledge to design adequately using nature without the co-operation of specialists, and his outline clearly states that design should be interdisciplinary.

Fisch (2017, 3) outlines the central position of biomimicry, saying that "there is a 'nature' out there that we can learn from, where so-called intelligent design holds the secrets to the survival and future well-being of the human race." Techniques from biomimicry exist in many places—velcro, for example, was developed in 1941 by Swiss engineer George de Mestral after noticing the shape of Burdock burrs stuck to his clothing.

Biomimicry has been criticized as an inadequate solution and a methodology that still gives the human primacy. Fisch (2017) calls Beynus's biomimicry study a "science of nature," and offers Oxman's work as an alternative, calling it a "technology of nature." In other words, Fisch (2017, 23) identifies that designs which employ biomimicry are "forever troubled by the premise of a relationship to an original." Fisch believes biomimicry:

> easily becomes entangled in a binary structure of power as the question of who is in position to issue evaluative judgements on the degree to which emulation succeeds in

> reproducing the quality of the original becomes a matter of who has authority to speak. (Fisch 2017, 23)

As an alternative to biomimicry, Fisch points to the work of Oxman, who avoids the burden of having to reproduce an "original" by deploying emergence as a technology for design. Oxman favors the material over the form, and uses computational mapping to develop a vocabulary of material behavior in what she calls Material Ecology. Her design method uses "computationally-enabled form-finding, informed by material properties and environmental constraints" (Oxman 2010, 33), in which the material itself dictates the final digitally-rendered product—the dialogue between the resource and its environment determines its final form. Hensel et al. (2010) call this approach "computational morphogenesis." When materials are placed together in different situations they behave—grow and come into form—differently. Oxman's proposal is inspired by "Nature's strategies where form generation is driven by maximal performance with minimal resources through local material property variation" (2010, 5).

If Benyus suggests we look at strict "diagrams" for sustainable systems, Oxman offers an "ecology of material iterations with which to think" (Fisch 2017, 24). Both Benyus and Oxman promote design strategies that encourage the designers to reach across the species divide, but both render the nonhuman organism as a kind of human technology. In Benyus's case, it is necessary that natural systems remain static and unchanging. In Oxman's case, in developing a practice in which the material and the environmental are in dialogue, "a holistic view of design emerges that considers computation, fabrication, and the material itself as inseparable dimensions of design which results in objects that are ecological from the outset" (Oxman et al. 2015, 1) while her work does not deal directly with nonhuman living organisms in an interspecies collaboration or exchange, emergence between material properties and their environmental constraints is the vehicle that creates form. Fisch summarizes her work as follows:

> Although Oxman embarks with a process of mimicry when she draws on organic systems to innovate designs in technology, that method transforms at some point into one of inspiration. What ensues is a process that is not categorizable as belonging to nature, the human, or the technological but rather something that invokes a common charged potential that animates all toward a new arrangement of becoming. (2017, 24)

A central tenet of Oxman's thesis is that a material and its environment need to interact to produce form. Her final work does not involve living organisms, and as such could be considered a form of computational morphogenesis, a method for the digital or synthetic cultivation of natural materials.

Figure 59 - Neri Oxman. 2014. "Luna's Wonderer: Qamar." Image: http://neri.media.mit.edu/projects/details.

Figure 60 - Neri Oxman and Iris van Herpen. 2013. "Anthozoa: Cape & Skirt." Image: http://neri.media.mit.edu/projects/details.

Agriculture represents dominance over the morphology and behavior of plants and animals, and although this practice is as old as culture itself, biomimicry, computational morphogenesis, as well as Ingold and Hallam's (2016) "growing-in-making" offer alternative perspectives to working with nature, and invite questions about the production of form. The

insights invite questions: Can cultivation be considered a form of proto-biodesign? How might fashion be grown? Understanding the processes of growing-in-making and emergence could give designers the opportunity to make socially just and environmentally sustainable decisions in the early stages of design.

In papermaking, the processes of emergence are visible. The papermaker acts upon the kōzo tree—nourishes, waters, weeds, prunes—to negotiate the form of the fibers that will later be extracted. In what Ingold and Hallam (2016, 4) refer to as "an intervening play of forces," the fibers undergo many steps of processing, during which environmental forces—water, fire, sun, air—are exerted upon the fibers. These same environmental forces shape the fibers before and after harvest by the papermaker. It follows that any interspecies collaboration using emergence as a vehicle is mediated by the environment in which the collaboration takes place.

4.3 Paper and Fashion

One example that can be useful in examining the concept of emergence is kamiko—paper clothing made from the fibres of kōzo tree. Now dying out as a traditional craft, this form of making clothing provides a framework for modeling interspecies design methods in the context of fashion. This section revisits paper clothing, which was introduced earlier in the chapter, to develop the position that emergence can be a vehicle for interspecies creative production in fashion design. The next section outlines how paper has been used in fashion in and outside of Japan to clearly make the distinction between Japanese paper clothing and other instances when paper was used for clothing. As explained in chapter 1, other natural materials that echo this interspecies collaboration in fashion design, such as leather or sericulture, may also be suitable for further examination using the theoretical framework outlined in this study; however, paper has been selected because it makes the arguments in

this study visible: that material and form can be made in collaborative communities that include the nonhuman. Though paper clothing has a history that extends beyond Japan, kamiko has been selected because non-Japanese expressions of paper clothing are not the product of collaborative engagements in local communities.

4.3.1 Paper Clothing Outside of Japan

Paper and paper-like nonwoven textiles infrequently appear in fashion, but when they are used for textiles and clothing they can carry disparate meanings and associations that can be accessed through local distinction, or derived from the context of use. A forerunner to current versions of paper clothing is the tapa cloth, a barkcloth made with paper mulberry—the same tree for making washi—used by people in the Pacific Islands for clothing, wall hangings, and mats. Tapa cloth is made in a similar manner to the earliest form of cellulosic paper, Egyptian Papyrus, which was made of layers of fiber laid across one another and beaten together. Papyrus can be brittle, but tapa cloth is soft and leather-like, because the fibers are longer. Like washi, tapa cloth is made from kōzo as a communal activity undertaken by many generations of one family together.

Figure 61 - Tapa cloth. Image: Leitner (2007).

In Europe, paper clothing has had a different history in terms of use, materials and techniques for production. Uses of paper resulted from economic need in dire times. During World War I, the Prussian government sent a delegation of researchers to Japan to learn about paper-yarn making skills to address Prussia's textile needs resulting from dwindling resources and trade embargos. Their mission was based on J. J. Rein's 1886 account, in which he describes Japan's robust papermaking industry. The World War I delegation's mission was fruitful, and they brought back technology to make paper yarns domestically in Germany. The lack of other fibers encouraged growth in the paper textile industry and its applications were widespread as an ersatz cotton, adopted along with other austerity measures, but it was not widely accepted by consumers—due to lack of comfort, and memories of wartime austerity—and once the war ended was quickly abandoned in favor of more comfortable yarns (Leitner 2007, 149). In Europe, only Finland has a lasting culture of woven textiles made from paper, and is even experiencing a resurgence of interest in paper yarns (Leitner 2007, 149; 2005, 36).

Figure 62 – German wartime advertisement for paper goods. 1918. Image: Leitner (2007).

Paper and paper-like materials are not only used in times of need, but can also be used in high fashion as tools for creative expression. Tyvek, a synthetic nonwoven material commercialized by DuPont in the 1960s, has been used as a paper substitute in fashion and can express an optimistic view of the future—one in which we don't do the laundry, because paper garments are disposable. Between 1966 and '68, this association was instrumental in selling hundreds of thousands of "paper" Tyvek dresses to women (Palmer 2007). Tyvek can also be avant-garde, as seen in Martin Margiela's F/W 1997-98 collection, where he challenged conventional material identities; or Tyvek can reflect utopian/dystopian visions of the future, as in Hussein Chalayan's 1999 S/S collection in which he presented an unmarked, bionic-white future design paradigm of rounded edges and empty, flat surfaces. Handmade paper, however, can embody tradition *and* the future, as in Issey Miyake's kamiko-inspired wrinkled paper garments for his 1982 F/W collection, as well as the traditional oilpaper used in the 1984 F/W, and the geometric high-vis cycling-inspired paper garments in his 2013 S/S

menswear line. Miyake has been a modern pioneer of traditional craft materials, translating washi and kamiko into high-fashion, and the paper used in his collections was made in Shiroishi, the place in which data was gathered for this chapter. Miyake also developed new materials based on washi, by bonding it with rayon, laminating the surface to change its texture and hand, or weaving canvas and producing low-gauge knits made from washi yarns. Further, the designer chose to use recycled polyester for button holes and other areas that would require added durability such as underarm, cuffs, neckbands, front facings, etc. Despite kamiko historically being associated with the poor, Miyake targeted at the wealthy, with garments ranging from ¥39,900-210,000 (Higuchi 2013).

Figure 63 - Paper dress with Bob Dylan's face. Circa 1967. Image: Zidianakis (2007).

Besides these recent examples, the last major appearance of paper clothes in the fashion world was between 1966 and ’68. For two years, hundreds of thousands of simple, disposable dresses, printed with unique patterns flooded the European and North American markets. They are examples of how forward-thinking designers from the Space Age, who prioritized human convenience over ecology, engaged with “futuristic” materials. These garments were novel thanks to their unusual material characteristics and printed embellishment, and were marketed to young women who were enticed by their disposability,

as well as the titillating possibility of exposure if the dress tore while it was worn (Palmer 2007). Disposable and marketed as a fun alternative to laundering, these semi-disposable dresses were a product of the optimistic attitude toward technological progress in materials science that emerged during the 1950s and ’60s. At this time in the West, technology was considered a panacea for domestic inconveniences, and the desire for new gadgets, coupled with the ascendancy of capitalism and a lack of ecological awareness meant that design methods—those used to generate products and garments—were mainly concerned with formal elements and desire creation (Papanek 1971, 16).

The paper dresses of the 1960s embody standardization, the erasure of local idiosyncrasy, and symbolize the fleeting nature of fashion, particularly the speed with which a consumer can dispose of clothing—if you became bored of your paper dress, you could simply throw it away. As embodiments of the ideological stance of neoliberal capitalism and laissez-faire resource use in the ’60s, these dresses are a useful example of the problems related to material extraction and waste in the fashion industry. The emergence of paper clothing at this time represents an extreme form of planned obsolescence, connected to an impossibly optimistic consumer desire: the belief that limitless resources would allow an endless procession of novel consumer goods. For these and other reasons, such as production methods, materials, context of use, etc. Western paper clothing is distinct from Japanese Kamiko.

Kamiko is distinct from the Western context of paper garments for two central reasons. First, they are employed by designers to express the past and future—as in Hussein Chalayan’s and Issey Miyake’s usage. Second, they are oppositional to contemporary mass-produced fashion in that they are selected by designers or wearers to express a specific locality. The above-mentioned examples employ paper in a manner in which the design or materials do not overtly express sites of production—origins are erased or unintentionally

obfuscated by the producer. This reflects the general tendency of the contemporary fashion industry to produce items which are standardized—where local idiosyncrasies are erased—concomitant with a mode of mass-producing garments and laissez-faire resource use. In many ways, Japanese paper clothing embodies the opposite of this: it is grounded in the landscape, produced in small batches, and, despite the associations we have with paper, *not* designed for disposability or expressive material novelty.

4.3.2 Paper Clothing in Japan

While the roots of paper clothing in Japan can be traced back to Buddhist temples, records of paper clothing being produced to be sold as souvenirs of travel, called *meibutsu* in Japanese (directly translated, means "famous thing"), stretch back as far as the Edo Period (1603-1867), and have been associated with that age of mass domestic travel and trade, when Japan was still in a period of self-imposed isolation. Increased mobility at that time opened faraway parts of the country and developed interest in local crafts, foods and skills (Traganou 1997). The formation and dissemination of local identity through craft objects continues to be a widespread cultural practice in Japan. This is instigated by various actors within a given region, from members of industry to local governments and tourism agencies who all promote the continuation of skills and communities in the countryside—sometimes as a means of pushing a nationalist agenda. In Japan, the categories of "art craft" (*kogei*) and "traditional craft" (*mingei*) were formed at the turn of the 20th century by government initiatives to differentiate these from other forms of emergent contemporary art and to give them unique value and authenticity (Kida 2010). There are over 3,300 local "art craft" and "traditional craft" products in Japan (Intage 2016), as well as fresh produce and perishables sold as *meibutsu*. Of these, there are a number that stand out as contemporary favorites: A Langue-de-chat cookie called Shiroi Koibito and Yubari cantaloupes—both from

Hokkaido—take the first and seventh spots, respectively (Intage 2018) in a recent national survey. Clothing made from washi was one of these popular souvenir products.

There are three forms that washi clothing or textiles can take: kamiko, shifu or net. An explanation of each of these forms will be given below, with attention given specifically to the qualities of the materials at different stages of production, and a historical perspective on the production of locally-specific varieties of paper clothing.

Kamiko refers to a garment made of kneaded and coated sheets of paper. Sheets are first treated with various liquids or pastes, such as *konnyaku* (starch from the devil's tongue root, to keep the paper from fluffing and make it water-resistant), agar agar, *kakishibu* (fermented persimmon tannin) or oils (including perilla, walnut, tung, linseed, poppyseed). Written records of the use of konnyaku paste as a finish date back to 18th-century domestic handbooks (Omura, 1999). Treated sheets are kneaded until they become soft and resemble the hand and behavior of fabric. These sheets are then attached to form a bolt of cloth, which is cut and stitched together to construct a garment mostly using conventional sewing methods. While it seems counterintuitive to use nonwoven sheets of paper in the place of traditional woven textiles, washi made during the 18th century (when the number of local varieties was at its peak) was so strong that it could be used as rainwear and for firefighters' uniforms after being treated with oils and tannins. Some types of washi were favored for books as there was no fear of the pages sticking together if soaked—the books could be restored to their original state by simply drying them out (Narita 1980, 28). Also, spot-cleaning and even laundering of paper garments was possible (finishes may need to be re-applied after drying). This kind of clothing was very warm, and typically worn by monks (who wore it in white) and lower classes and farmers (who wore it colored brown), but by the late 17th century, using techniques like block- and stencil-printing and dyeing, colorful versions became available for the upper and middle classes.

Figure 64 - Kamiko. A frottaged kamiko dyed using natural dyes, originating from Shiroishi. Circa 1960.

Figure 65 - Kamiko. Stitching detail of frottaged kamiko dyed using natural dyes, originating from Shiroishi. Circa 1960.

Shifu refers to a cloth woven with paper yarns. Sheets of washi are sliced into thin strips, twisted into yarns, and then woven (often silk or cotton is used in the warp). This technique produces a very fine fabric, similar to linen, cotton or silk gabardine. Generally this material was expensive and therefore exclusively worn by the higher classes, but a rougher version called "*moro-jifu*" (roughspun paper cloth), made with lower-quality paper yarns in the warp and weft, was worn by farmers as workwear or sleepwear.

Figure 66 - Shifu. Indigo-dyed and likely originating from Sendai

Netted paper clothes are textiles made from paper yarns that are knotted together instead of woven. These clothes were worn as undergarments to create space between the body and outer garments. To make such netted garments, sheets of washi are sliced, twisted into yarns and then knotted together like fishing nets. In the past, these garments would often be made from recycled ledger paper, and the black ink from writing and red ink from personal seals would sometimes remain visible as specks in the finished product.

Figure 67 - Netted garment. Parkes Collection. Courtesy of Royal Botanic Gardens, Kew. Circa late 19th Century.

Figure 68 - Netted garment details. Parkes Collection. courtesy of Royal Botanic Gardens, Kew. Circa late 19th Century.

The tools and skills for making washi were first brought to Japan from China via Korea by Buddhist monks around 610 CE. Washi was initially made exclusively by monks for use in ceremonial writing, and was thus very valuable. The advent of paper clothing in Japan as a temporary garment is attributed to a 10th-century monk named Shoku, who pasted together his valuable sutras to make clothing (Katakura 1988). Since the Heian Period (794-1185), kamiko played an important and ritualistic role in the lives of Buddhist monks. These garments were made from locally harvested raw materials and made almost exclusively in temples. Worn on the backs of Buddhist monks, kamiko became linked to spiritual purity and honesty, a characteristic which would later make the garments desirable to samurai warlords during the 15th and 16th centuries, this connection may also be why papermaking was taken up in the 13th century by unemployed samurai (KWKK 2017), who would develop the techniques for making *shifu*, and very strong paper. By the 18th century, urban development, coupled with a growing economy and population, coincided with a rise in the demand for entertaining diversions such as arts and crafts—especially washi, which found many everyday applications, and was developed into numerous clothing materials. It was used to disseminate images and texts, and incorporated in architecture, home furnishings, fashion,

and textiles. Hundreds of regional forms of washi were developed via small-scale operations—and each variation was contingent on a local climate, landscape and community that became legible through the strength, color, weight, texture, surface effects and hand of paper.

Published in 1797, the four-volume Illustrated Encyclopedia of Famous Regional Items (*Nihonsankaimeibutsuzukan*) is a guide to the various regional specialties one could acquire from different parts of Japan. The fourth book in the volume contains an image of a paper-clothing shop titled *Ōshū Sendai Kamiko*. This shop was located in the Ōshū area of Sendai, in what is currently known as Shiroishi Town, Miyagi Prefecture, which provides the site of data collection for this chapter. The caption on the right of the image reads "仙台かみこ　地紙つよく　能もみぬきて　こしらゆる故　やはらかにて　つやよく　奥州木綿が少なき故　中人以下は おほく紙子をきる也　夜具も大方は紙子にてこしらゆる也", which translates to "Sendai kamiko. It's made of strong paper and is well kneaded, so it is flexible and lustrous. There isn't much cotton in Ōshū, so the common people have to wear paper clothing and most people wear it for sleepwear" (Transcription of Japanese transcription from Tsujiai, 1966. Translation is author's own). After this passage, the original author lists five other localities in Japan that were famous for producing kamiko in 1797.

Figure 69 - Shiroishi. The kamiko shop. Image: Tessai (1797).

To the far right of Fig. 69 you can see large wooden tubs. These tubs would likely be filled with water to soak the paper and soften it before kneading, which is what the two bare-chested men are doing in the foreground of the image. Washi is strong enough that it can be soaked in water without falling apart, which allows it to be laundered. The work of kneading softens the sheet, and allows it to behave like fabric. The woman to the left is carrying a bundle that appears to be a package of finished garments ready for sale. The older man seated behind them is applying what is likely konnyaku paste. Next to him is a small receptacle for the paste, which he is applying with a spatula. Finally, the woman behind him is attaching the individual sheets together to make a roll of cloth of sufficient length for a kimono, *obi* belt or other garment. You can also see finished paper garments and rolls of cloth tucked away in the closet behind them to the right.

The warmth and ease-of-use of kamiko would allow it to eventually become part of the common clothing for people who couldn't afford cotton. Linen and hemp were the main fibers worn by the common classes for many years, but cotton entered the market in the 15th

century and was quickly adopted by the upper classes as it was warmer than linen or hemp and more suitable for winter clothing. Paper was favored as a substitute for cotton as it also made warm garments that were water resistant and easy to repair. Paper wasn't inexpensive, but with access to tools, people in the lower classes could take up the trade and make their own, using the locally sourced and easy-to-propagate paper mulberry trees.

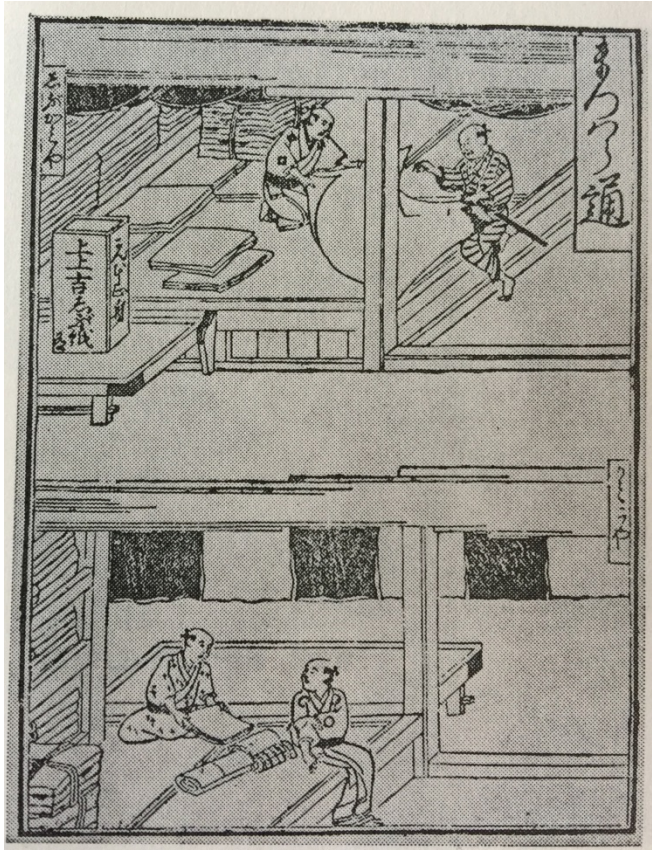

Figure 70 - Kyoto. Paper textile and kamiko shop. Circa 1665. Image: Natsumi (1980).

The top cell of Fig. 70 depicts a fashionable washi shop in Kyoto. In 1665, when this image was made, the variety of papers produced in Japan allowed for a plethora of daily uses for washi. The top cell depicts a shop that would sell a variety of treated papers from around the country for the customer to use in any way they desired. The lower cell shows a kamiko shop and a salesman entertaining a customer with rolls of treated paper fabric between them. Most of the fabric is plain-colored, but one has a stripe (Natsumi, 1980).

Kamiko eventually lost some of its spiritual associations and became a material linked with rurality and poverty, and over time was ironically or playfully adopted by other classes.

For example, a kamiko garment made of pasted-together love letters is used symbolically in kabuki plays to express that a character has fallen on bad times or is down on their luck (Fukai 2007). In kabuki plays, kamiko has two uses: First, as a jacket of pasted-together love letters, which could be an ironic statement about the value of the cloth coming from content of the letters rather than the material, and second, to illustrate that a character has suddenly become impoverished (Leitner 2007, 71).

Kamiko was used as clothing for poor people as the material was affordable, readily available, retained heat, and could be easily mended. Due to the associations with poverty, paper clothes were often worn in private spaces: as undergarments or as at-home wear.

Figure 71 - Depiction of kabuki actor wearing kamiko. Circa 1873. Image: Collection of the Tsubouchi Memorial Theatre Museum, Waseda University, Tokyo (Fukai 2007).

By the latter half of the Edo Period, paper clothing became widely popular. The rising middle and upper classes may have worn such garments to circumvent the numerous class-dividing sumptuary laws in place at the time. While many colors, textiles, and styles of clothing were forbidden to be worn by certain classes of people, wearing washi was not explicitly forbidden. Therefore, this period in history sees the richest variety of creativity and

local distinction in the design of paper garments. Some kamiko were humble, with no color, but others were gaudy, mixing colorful *ukiyo-e* prints with imported European chintz. Eventually, paper clothing would transcend its roots as clothing for poor monks or farmers and come to be used by people from all social classes, including poets who sought to borrow ascetic humility from the garment, fashionable elites who may have wished to circumvent strict sumptuary laws and, most recently, contemporary fashion designers.

Figure 72 - Tosa. A colorful kamiko with ukiyo-e prints and conventional textiles. Courtesy of the Ino Paper Museum

Though washi varieties from the Mino, Echizen, and Ogawamachi regions are well-known (thanks to the heritage status accreditation from UNESCO in 2014), paper clothing is less familiar today as few towns still produce paper garments or textiles. Historically, such clothing from Kyoto was known for being humble and plain, while varieties from Shiroishi were famous for their strength and durability (Natsumi 1980). The latter is the only major town that still clings to its identity as a maker of paper clothes. Built on the foothills of Mount Zao, in Miyagi Prefecture, the town has a slowly declining population, but some of its roughly 35,000 residents continue to embrace Shiroishi's history as a producer of paper garments. The town is famous for three products: *kokeshi* dolls (lathe-carved, painted wooden

dolls with rounded heads), *u-men* noodles (short, narrow noodles), and washi, which is used mainly for textiles and clothing.

The traditional paper clothing culture here is shrinking, but has survived modernity and remains a unique example of both the resilience and precarity of small-scale local industries in Japan.

This chapter uses the case study of kamiko and shifu made from washi in Shiroishi. The case study investigates the potential efficacy of the interconnectedness between people and their local landscapes in producing a material culture. Localism is the study of this interconnectedness, and has been identified as a possible strategy to determine new methods for fashion design, in response to growing criticism of the environmental impact and ethical issues related to the global fashion system (Choi and Cheng 2014, *v*).

4.3.3 Shiroishi, Miyagi Prefecture

Ethnographic fieldwork for this chapter was completed in Shiroishi. Participant observation was done over the course of three days with two subjects who are also interviewed in this chapter: Mr. A (a local papermaker) and Satō (a kamiko maker). A short documentary film about Shiroishi and the papermakers' entanglement with the landscape was produced during fieldwork and screened at the Everything and Everybody as Material Conference in Borås, Sweden (Mohajer va Pesaran and McKean 2017).

In April 2017, I participated in the drying of paper made by Kurafuto, who have spearheaded the second revival of papermaking in Shiroishi (the first and second revivals of washi- and washi clothing-making in Shiroishi will be discussed in this section). Unofficially led by Mr. A, the group completes this stage of the papermaking process in the local kindergarten near his home, with the help of elderly staff and volunteers. On the day that I helped, a number of people were working: two local elderly women, a young woman who

was learning how to make paper, two curious government employees from city hall, and the head of Sennenji, a local Buddhist temple.

Shiroishi was selected as a research site because it is widely cited in histories of kamiko-making in Japan, and it is the last place in Japan that has kamiko studios (Tsujiai 1966; Natsumi 1980; Katakura 1988). Issey Miyake and his design team visited Shiroishi in the early 1980s to learn about traditional methods for making washi and kamiko, seeking inspiration for a new collection. At Satō Kamiko Studio, 77-year old Satō tells me about the day Miyake visited her studio and she showed him the traditional Shiroishi method of kneading and preparing washi for use as a textile, as well as the frottage method (*takuhon*) of applying three-dimensional patterns into the textile using 19th-century carved wooden boards and hammer-like brushes. In his 1982 F/W and 1984 F/W collections, Miyake used paper made by Mrs. S's late husband and another papermaker, Endō Tadao. They have both since passed away, and no washi makers remain in Shiroishi from their generation—the generation responsible for reviving the paper industry into a thriving business in the three decades after WWII.

Figure 73 - Shiroishi. Satō with her Edo Period frottage board.

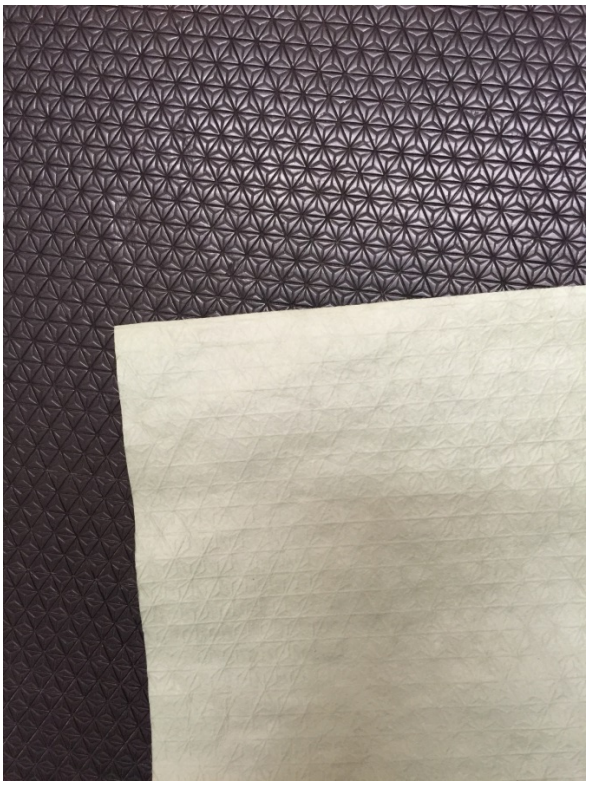

Figure 74 - Shiroishi. Detail of frottage pattern.

As is the case with many rural towns in Japan, Shiroishi's population is decreasing: from 41,852 in 1995 (1995 Census) to around 35,000 as of March, 2017 (Shiroishi City 2017). Shiroishi is one of many sites in Japan attempting to revive local craft-skills and -products, the production of which have been negatively affected by population decline, urban migration, offshore manufacturing and mechanization. Shiroishi washi would not be *Shiroishi* washi if it was produced anywhere else. The skills for washi-making can be taught, learned and shared, but the washi itself is the product of place-specific contingencies: human activity, soil, humidity, and local raw materials are all present in the formation of the final product. What also makes Shiroishi unique as a papermaking region and makes the region's paper further contingent on local geography and landscapes, is the clear water flowing from nearby mountains that runs through the city and is used at many stages of the papermaking

process. The environmental requirements of papermaking in terms of water usage are high—handmade washi demands an abundant natural source.

Producing washi requires almost 10 times the amount of water as pulp paper. For every tonne of paper produced, 15,000-20,000 tonnes of water is needed (AJHWA 1991, 51). This is why all washi-making towns flourish near mountain rivers or where subterranean water is plentiful. In these places, the path of natural spring water will sometimes be redirected to flow through washi workshops on its way to larger streams or rivers, or into groundwater. "Pollution" from traditional washi-making takes the form of plant-based organic materials from the papermaking studio. Setting up a workshop near an abundant natural source of clean water is economically strategic for papermakers: it gives them access to a vital, free, public natural resource. Shiroishi is located at the foot of the Zao mountain range, and draws water from the mountains via canals and deep wells of groundwater to individual houses and papermaking studios.

Thanks in part to the geography and climate of the local landscape, washi-making began in the Shiroishi region during the Sengoku Period (1467-1603) under the reign of Date Masamune (1567-1636), a powerful warlord from a wealthy family who conquered Sendai, the wider region that includes Shiroishi. Date ruled Sendai, but did not live in Shiroishi Castle; Instead, he bestowed it upon his trusted retainer Katakura Kagetsuna (1557-1615). As the climate in the region is not suitable for cotton production, Katakura and his descendants encouraged people to plant a species of paper mulberry (*Broussonetia Kazinoki*)—a type of kōzo—that grows well in the region, and to take up washi-making in the winter months between regular farm work. After two or three generations, the success of the Paper Mulberry crops became evident, and a strong, lasting papermaking culture began that was so successful in producing unique materials to the region, and providing the locals with work that Shiroishi kamiko and shifu were sent to the to the Shogunate as gifts (Katakura, 1988).

Kamiko and shifu are examples of slow fashion in the sense that each step of the washi-making process requires great care for and consideration of a local bioregion and community (Fletcher 2014, 261; 2010). An order of paper can take anywhere from 7-23 days to be produced by following traditional methods (AJHWA 1991, 22-23). The "slowness" here comes from the fact that washi production is limited by the changing seasons. The raw materials can only be harvested once a year, in January, and thus a year's supply of paper is made during a three-month period in the Spring. After harvesting the kōzo in January, and steaming, beating, and separating the fibers, washi sheets are made during the period before the rainy season (*tsuyu*), which tends to fall in June or July. The work at this stage is typically performed by an individual, with some papermaking regions separating it into two stages: first, making the sheets, and later, drying. Making handmade washi is labor intensive. The most time-consuming part of the process—the harvesting and processing of the raw material—was historically undertaken by a family or community. Some papermaking communities in Japan are supported by a local co-operative, known as a kumiai, but Shiroishi is not, because there are not enough remaining papermakers in the city to justify a co-operative.

As of April, 2017, the washi production in Shiroishi is maintained by 48-year old Shiroishi local, Mr. A, who is a member of Kurafuto, a papermaking group of around 15 volunteers and elderly staff. This individual has constructed a papermaking studio for his group in a two-car garage next to his family run shop, where they experiment and attempt to rediscover techniques for producing the washi that Shiroishi is famous for. One of the most famous papermakers in Shiroishi, Endō Tadao, passed away in 1997 and his wife, Mashiko, who continued his work, retired in 2015 at 92. Both of them ended their careers without apprentices. Knowing that there was no one else who would take papermaking up, Mr. A began making washi around 2012.

Figure 75 - Shiroishi. Mr. A's ad-hoc papermaking studio.

Figure 76 - Shiroishi. Mr.A uses old car batteries instead of a paper press to remove water.

I visited Mr. A's garage-studio to see how he made paper, and who was helping him. There, among his family's possessions, and the chairs and tables set up for visiting friends , I got a sense of the community from which Shiroishi's washi emerges. This garage-cum-studio and storage space is now the central location for papermaking in Shiroishi and from his makeshift workshop, Mr. A connects with the papermaking heritage of his city by continuing to make paper with other passionate locals in his Kurafuto group. The day I visited, he had one other papermaker with him, a young woman in her early 20s who was a university student, but expressed that she wanted to connect with her city's history and learn how to make paper.

On the day I visited, Mr. A worked behind the vat in his garage, scooping up pulp with a screen to make each sheet and then adding each wet layer to a stack behind him where the remaining liquid is pressed out by heavy car batteries. Papermaking is a social event for him—friends often visit and sit with him while he works, eating and drinking as paper is

made. These visitors sit on benches and chairs inside a small poptent Mr. A has set up near the vat, complete with a heater, table, and ashtrays.

Mr. A manages the growing, weeding, harvesting, steaming, separating, beating, and other papermaking tasks with local enthusiasts, volunteers and elderly staff that comprise Kurafuto. Despite the small size of the papermaking operation in Shiroishi, this is one of the few places in Japan that grows all its own raw materials. For every 1 kilogram of washi, 3.3 kilograms of raw material is needed (AJHWA 1991, 19). According to Mr. A, if he didn't grow the raw materials in Shiroishi, he could not use the label "Shiroishi washi"—this was his motivation for growing paper mulberry trees during the last 20 years in a half-acre plot, now surrounded by suburban houses.

Such fields have remained in this city for centuries, as long as craftspeople and farmers have made paper. While the roots of papermaking in Shiroishi can be traced to Katakura Kagetsuna and his promotion of paper mulberry crops, it is not known precisely when the practice began in earnest. Nevertheless, the city's reputation for producing high-quality washi, shifu, and kamiko endured from the 17th to the 19th century, and was restored again around the 1930s amid emergent needs for new materials during the interwar period, and due to a local desire to revive Shiroishi's washi-making heritage (Katakura 1988; Natsumi 1980; Tsujiai 1966).

Since the end of World War II, the demand for handmade paper has decreased in the region and throughout Japan due to a number of factors, including the importation and implementation of papermaking machines and inexpensive US and European cotton, which replaced washi as a material for textile-producing yarns (Ōhno, ND). Across Japan, many papermaking houses shuttered; others diminished their scale of production to match the decreasing demand. During the 18th and 19th centuries, there were around 300 papermaking houses in Shiroishi (Nakata N.D.), but by the start of World War II, only 30 washi-making

houses remained, which were further threatened as businesses chose to produce Western paper. As a result, the local washi industry completely died during the interview period. During the interwar period, regional historian Katakura Nobumitsu, a descendant of Date Masamune's retainer, Katakura Kagetsuna, devised a response to this problem. He extensively researched the history of the area and, together with Shiroishi locals Endō Tadao and Satō Chūtaro (the late husband of Satō, who provided Issey Miyake with the paper for his 1982 and '84 F/W collections), revivified the local papermaking industry after traveling Japan to re-learn regional techniques and later returning to encourage other craftspeople to make kamiko, shifu, and washi. By 1936, this group had successfully resuscitated the local industry, and by the start of World War II, shifu production in Shiroishi boomed as it became a replacement for cotton in military uniforms and everyday clothing. Katakura and his group devoted their lives to studying papercraft in Shiroishi and resurrecting this culture, and the town once again became known for shifu and kamiko in the latter half of the 20th century. Shifu would ultimately prove to be too expensive to produce, and it is not being made in Shiroishi at this time.

The efforts of Katakura and his cohort were successful for many years, with Endō Tadao becoming recognized as one of the top papermakers in the country. The revived kamiko of the modern era was not made to be worn (Fig. 4), and likely wasn't purchased to be used as clothing, with one exception: In 1973, his papermaking studio became the sole provider of the washi used in a Buddhist ceremony popularly called "*Omizutori*," in which monks wear handmade kamiko, traditionally produced with Shiroishi paper, for the duration of a grueling two-week ritual (Nakata N.D.).

The Omizutori ceremony—involving water, fire, and paper—has been held every March at Tōdaiji Temple in Nara Prefecture for the past 1,200 years. This is the only place in Japan where traditional handmade kamiko is still used ritualistically. The ceremony begins

when the monks receive their handmade paper and start softening it into a flexible textile. They then apply liquid agar agar to strengthen the paper and keep its surface fibers from becoming fluffy during the softening process, and, finally, the pieces are sewn together to form garments. These steps are all meant to be done by the individuals who will participate in the ceremony, but I was told by a monk in Shiroishi that their wives may help them with the sewing. The ceremony during which they wear these garments involves the monks drawing water from a well and then carrying large pine fire torches. The sparks from these torches, which are meant to signal the arrival of Spring (AJHWA 1991:80), leave burn marks, stains and tears on the monks' white paper garments. This traditional festival links the monks of Tōdaiji Temple with kamiko and, by extension, the people and landscape of Shiroishi.

Figure 77 - Shiroishi. Robe worn during Omizutori Ceremony. Courtesy of Senennji Temple.

Figure 78 - Shiroishi. Robe worn during Omizutori Ceremony. Courtesy of Senennji Temple.

Kamiko's symbolic use in the Omizutori ceremony at Todaiji temple in Nara is one of the oldest recorded examples of paper being worn in Japan, and the oldest continuing

tradition of wearing paper. The spiritual associations of making kamiko mean that its preparation and production can be meditative, a laborious and time-consuming practice.

Made with materials found in the natural world, washi is fragile, especially when worn on the body, and impermanent, because it is susceptible to fire, insects, stains and water. The Buddhist concept of *shogyōmujō* in Japan helps contextualize the use of the paper used in garments like those worn by the monks for omizutori. Shogyōmujō deals with the transitory nature of all living things and the fact that life is intimately bound up with the cycles of nature—this is evident in the use of paper. Perhaps monks wear fragile white washi robes as symbols of their humility and simplicity. Attempting to borrow these qualities during the 15th and 16th centuries, samurai and the warrior class would adopt paper clothing to emulate monks.

Figure 79 - Shiroishi. Mr. A's kōzo field.

Since the revival of the industry in the 1930s, Shiroishi has not imported the raw materials for washi. While Mr. A has only been making paper since 2012, he has spent almost 20 years maintaining and propagating a local variety of kōzo in Shiroishi. These kōzo trees growing in Shiroishi today are propagated from the same trees that the Endōs used to

produce the washi for the Omizutori festival and Issey Miyake's fashion collections. These trees were propagated or transplanted from Endō Mashiko's kōzo fields at her request 20 years ago. For the past two decades, Mr. A and Kurafuto have been tending the single remaining crop on a half-acre plot in a now-residential area of Shiroishi. The fibers extracted from these trees provide the bulk of the raw material for Shiroishi paper. According to Mr. A, kōzo bulbs seem to produce different quality fibers depending on where they are planted:

> You can take a seedling from here and move it to another area and get a completely different result. Even within Shiroishi, each field is different. I don't know how they are different and I can't say it in words, but when you grow it and make the product you see the difference. Even in one field, one side is different to the other. It is best to utilize this difference, because we can't get the same quality they grew in the past, so we use every part of the plant (Conversation with Shiroishi papermaker Mr. A 2017).

This regional specificity is part of what makes the remaining papermakers of Shiroishi dedicated to not only retaining regional techniques for making washi, but also local resources. Oxman's (2010) suggestion of environmental impact in the emergence of form can be seen localized in Mr. A's fields. This phenomenon of local specificity—placeness—will be discussed further in the next section.

When I asked Mr. A why he began making washi in 2014, he answered, somewhat jokingly, that he had become tired of people asking him where he was from and then being embarrassed when they would reply with a question about washi or kamiko—Shiroishi is relatively well-known in Japan for its papermaking history, but during the past two decades the local washi industry has become almost non-existent. He was aware that production was in decline, but also that Shiroishi has been closely linked to washi for centuries. Mr. A acknowledges that it is difficult for paper textiles to compete with mass-produced paperlike materials, such as Tyvek. Mr. A himself understands the irony of making paper for clothing: "You can get things out of manmade materials that you can't get out of paper. I like Nylon and Goretex, but it's not the same thing at all."

Since the Endōs retired, it has been Mr. A's goal to keep the papermaking in Shiroishi alive by producing it himself with Kurafuto and also through public-facing events such as workshops, and by being inclusive and open to questions about the techniques and process of papermaking. The paper that Mr. A made during the first few years was primarily used for public workshops run by the Kurafuto group, during which participants made light fixtures from washi. Remaining transparent in terms of production methods is an approach that Mr. A learned from the Endōs, who—though they never officially took an apprentice—would discuss papermaking in detail with visitors and even give advice or criticism to aspiring papermakers. According to Mr. A, the Endōs were regarded as being open—they wouldn't keep industry secrets and would answer questions frankly and generously. Though never officially an apprentice, Mr. A also benefited from this guidance: In the first few years that he made paper, he would take completed sheets to Endō Mashiko for her criticism—she initially only approved around two out of every 100 sheets as appropriate for selling, but after progressing, she accepts 90 of 100, he says.

4.3.4 Paper and Placeness

To gain a deeper understanding of the history of paper clothing in Shiroishi and how it relates to localism and sustainability, geographer Edward Relph's theory of "placeness" and architect and historian Kenneth Frampton's theory of localized forms of design will be discussed in this section.

Relph emerged in the 1970s with a group of geographers—sometimes labelled as "humanistic geographers"—who believed interpretations of place were lacking and focused on "the importance of human experience and meaning in understanding

people's relationship with places and geographical environments" (Seamon and Lundberg 2017). They were interpretive geographers, and criticized for their inductive approach: "In turning away from deductive theory, predefined concepts, and measurable validation, how could humanistic geographers be certain that their interpretive conclusions were accurate, comprehensive, and trustworthy?" (Seamon and Lundberg 2017, 7-8).

Place is a central theme of geography, and Relph's exploration of the concept in 1976 remains a useful means of investigating how place functions in modernity. His framing of the phenomenon still resonates beyond geography—despite criticisms from Marxists, feminists, poststructuralists and other geographers in the ensuing decades—and has been utilized by ethnographers (Wozniak 2009), literary theorists (Stenport Westerståhl 2004), philosophers (Casey 2009) and others in the cultural studies.

The main reason to incorporate this theory into fashion studies, is because it helps with address the subjective (internal) and objective (external, or Earthly) aspects of making in a landscape. Place is where we see these two intertwine, especially when paired with more recent perspectives on ecology and contingency proposed by Haraway (2016) and others who emphasize our material connectedness—at all levels—to the "outside." This perspective has been taken up in

the context of the Anthropocene, where our connection to Earth is legible in changes to our environment.

According to Relph (1976, 30), the *placeness* of a place is embodied in the daily lived experience people have of the things in it. The papermaker or cloth-maker is therefore as much a part of their landscape as is the raw material for the cloth—"local" in this sense means unique to the direct geographic locality, in that the same species of paper mulberry tree, grown in two distinct areas, won't always generate the exact same material culture, as Mr. A believes. Relph's thesis concerns a way of talking about and perceiving the environmental contingencies that rest in each unique locale, but that are also engaged in a negotiational relationship of exchange: the boundaries between a place and the things in it are not solid. Relph (1796, 79) further notes that when speaking about place, one must also consider the symmetrical concept of "placelessness"; "place" concerns the vernacular idiosyncrasies of everyday and material culture, whereas "placelessness" denotes an inauthentic, mechanistic world of standardization and uniformity. These two concepts are intertwined, says Relph, which creates tension.

Choi and Cheng (2014, *v*) identify that the local is not necessarily always in direct opposition to the global, as fast fashion companies who sell globally still employ local sourcing methods to shorten supply chains to reduce the environmental burden of production. Nonetheless, mass-produced fashion is a uniquely placeless enterprise, where the local socio-material contingencies of production are intentionally obfuscated to promote brand messages. The dominant fashion industry, built from rafts of disembodied symbols, exists as a fleet of placeless floating islands anchored to nowhere in particular. Despite this, a system of material production does exist that gives value to materials and objects that can *only* be made in a specific region because of the linkage between people and landscape. This means that local

material idiosyncrasies can manifest a sense a place through garments as an expression of "dynamic dialogue" (Fisch 2017, 24) between humans and nonhumans bound to a specific place. This idea of local idiosyncrasy is particularly relevant to this study, as it suggests that the materials for fashion can carry distinct traces of the places in which they were formed.

A method for fashion design could be promoted that is aware that a region-specific sense of place—or *terroir*—exists within cloth in the same way locality can be identified in wine or cheese as an expression of the seasons, region, climate, and landscape (Eriksson and Bull 2017). The Merriam-Webster dictionary defines the French word *terroir* as "the combination of factors including soil, climate, and sunlight that gives wine grapes their distinctive character." The term is generally used to describe wine or food, but it might also be used to differentiate other products that are generated through a relationship between people and nonhuman organisms in a local landscape—and obfuscated in products generated through complex supply chains.

Japanese papermaking communities can teach us about the *terroir* of materials—and the potential material terroir of fashion—by forcing us to pay attention to local ecologies of people, plants, climate, geography and other aspects of the landscape.

During the Edo Period, papermaking spread throughout Japan, and each area developed its own unique washi, which varied in quality, texture, flexibility, water resistance, and application. According to textile and craft historian Tsujiai Kiyotaro (1966), washi which had been treated with various pastes and oils to make it suitable for kamiko was sold directly to customers by the bolt, so that they could make paper garments themselves. Tsujiai (1966) lists 13 famous places in Japan for kamiko that also made region-specific paper, each with its own distinct characteristics. For example, artisans in Kyoto were known for producing a humble, non-printed kamiko, while in Harima (present-day southwestern Hyōgo Prefecture, near Kyōto and Kurotani), where the paper was used for copying sutras, craftspeople

produced a resist-dyed stencil print, dyed using fermented persimmon tannin. Echizen, north of Nagoya, was known for producing a fashionable woodblock printed chintz, or frottaged kamiko.

In Shiroishi, the phenomenon of place actively manifests in Mr. A's garage workspace. There, he and his group—who have engaged with the local landscape by propagating and cultivating Endo's kōzo trees—participate in the final stage of drawing and shaping each sheet of paper from a vat of kōzo fibres. However, they are not making the same paper that was made in the postwar period; these sheets express Mount Zao and Shiroishi's current water, soil, humidity, landscape, and the parameters of Mr. A and his group's technical abilities and his garage facilities. These difficult-to-quantify factors all connect—akin to fibers that lock together—in each sheet of paper and produce Shiroishi *as it is now*.

This notion of the landscape being read in a material, or terroir can be understood using the theories of Kenneth Frampton (1983), who argues that the "local"—in terms of terrain and customs—should be considered in any architectural proposition, and this perspective can also be considered in relation to textile and fashion design. The central thesis of Frampton's argument hinges around the idea of "Critical Regionalism," which is a call to "mediate the impact of universal civilization with elements derived *indirectly* from the peculiarities of a particular place" (21, emphasis in original).

Critical Regionalism is the name of a set of related concepts that were developed in the 20th century based on an influential 1941 article called *The South in Architecture*, written by American historian and critic Lewis Mumford, which laid the

groundwork for a regional turn in architectural theory. Though several theorists proposed approaches to critical regionalism—particularly Tzonis and Lefaivre (1981)—Frampton (1983) developed the most well-known and resilient definition. Subsequently, it became an important theory for architects and theorists wishing to negotiate the globalizing forces of post-modernity with the traditional and vernacular presence of pre-modernity. Unlike related theorists, Frampton framed critical regionalism as "resistance" against "universal civilization." To Frampton, the weakness of the Enlightenment and Modernist projects that gave way to this universality was that they erased regional culture in a drive for progress and efficiency; the desire for a flat, clean, mass-produced culture—surfaces for the messy reality of resources, and exploitative materials and labor to hide behind.

Critical regionalism has been discussed widely since Frampton's key text was published in the 1980s. Its applicability outside architecture has grown since then, with researchers finding meaningful uses across the humanities. Though useful to fashion, it has not been widely used as a tool for understanding how regional variations can flourish alongside and against universalizing trends. The universal culture identified by Frampton is evident in the way fashion has been designed and produced in recent history: It is designed in a central location, often one of the major fashion cities around the world and often with a sense of the dominant fashion trends; these trend-led garments are then produced offshore, employing standardized sizes,

stitches, fabric quality, dye lots, etc., to be shipped to different places around the world. Frampton is critical of the imperialistic tendency of modernist design to ignore or erase the idiosyncrasies of the local, but he does not reject it completely. Instead, he invites technical and cultural progress, but implores architects to consider specific landscapes, customs, building methods, and climates when working on a project (1983, 26). Can we extend his ideas to material-making for fashion design? Rather than the modernist fashion design method that starts from the intangible (economic or market-driven impulses), can we have a material-making system that places value on local idiosyncrasies?

Frampton's proposal, if applied to fashion design methods, could be useful in developing frameworks for locally-oriented sustainability. But reflexivity is necessary when working with Critical Regionalism. Though it has been highly influential in architecture, there are certain problems with employing this theory in the context of papermaking in Japan, or fashion in general, in the 21st century. It is a Western theory imposed on non-Western locales, rendering them as peripheral to a global order, and positioning them as starting with limited agency in this power struggle. Eggener (2002) who is one of the most influential critics of Frampton's theory, further identifies the importance of paying attention to the "state of mind" of regionalism, by "heeding the voices of those responsible for building particular cultures" rather than "imposing formulas upon them," where those formulas are

universalizing, Western theories such as Critical Regionalism itself. Following the pointed criticisms of Eggener, to be used effectively, Critical Regionalism should not be employed simply as a term, or a style, but as a process, a means of understanding complex negotiations of meaning that take place in exchanges between universal and the local. The research that this study is based upon has sought to do just that. Through careful fieldwork—including semi-structured interviews and participant observation—with people involved in papermaking in Japan.

Human beings are anchored to their landscapes and communities in tight tangles through material culture. In Japan, handmade washi paper is one example of how this materializes, and traditional kamiko offers insight into a specific method for fashion design that considers embeddedness within landscapes and local communities. The products made by the dominant fashion industry are often disconnected from their places of origin, with links suggested only by the "Made in:" text on a garment label, which can be seen as "the manipulation of elements predetermined by the imperatives of production" (Frampton 1983, 17). The "imperatives of production," including labor cost and efficiency in the fashion system, can be seen in the large-scale offshore manufacturing of garments for global distribution. Because local peculiarity is subsumed into standardization, these garments and textiles have an altered sense of place and time. Their lifespan is invented, and their appearance is concomitant with a synthetic sense of place: a disembodied apparition of their branding associations.

In the narrative of fashion sustainability, ideas of locality, regionality, and a return to a nostalgic imaginary of rural craft landscapes are often used for marketing and branding

purposes—a "kind of superficial masking which modern development requires for the facilitation of marketing and social control" (Frampton 1983, 17).

Standardization in the global supply chain is a cost-effective strategy when it comes to sizing, styling, fit, materials and laundering because it reduces the need for new cuts and styles suited to local tastes, and it allows for economies of scale. However, standardization is concomitant with a proliferation of specific materials, cuts, patterns and shapes, which could result in homogeneity across local and global markets. In response to this, consumers are seeking "realness" or "authenticity" when making purchase decisions (Koontz 2010). Koontz identifies methods that marketers and producers use to build notions of authenticity into their products. One such method is "traditionalizing," in which producers:

> ...construct a sense of connectedness by defining products as perpetuating a cultural tradition or heritage. Audiences can then experience and become a part of this tradition through their consumption patterns. Producers and marketers authenticate the hands-on qualities of traditional production methods and the uniqueness lent from historical connections to the land. (Koontz 2010, 986)

This insight into authenticity shows that value-creation based on the notion of localism in the sites of production of fashion is a viable practice. However, the dominant fashion industry tends to use production systems based on economies of scale that favor standardized practices that hide the ecological conditions that produce the materials for fashion.

Research on supply chain transparency and consumer involvement in production (Wu 2010) or "design co-creation" in a mass-produced standardized fashion system (von Busch 2012) has not shown that consumers have a clear notion of what things are made of and where they are made. This may indicate an opportunity for designers to develop design strategies that are transparent at all stages, from the raw material to the assembly of the garment, and that consumers will react positively to these strategies. Important questions emerge at the moment of change brought about by the Anthropocene: How can alternative ways of making clothing and textiles—making materials with placeness and local ecologies

in mind—be developed? What kind of fashion system could emerge from studying traditional forms of production that are contingent on placeness and local ecologies such as washi-making in Shiroishi?

In Shiroishi, kamiko and shifu are shaped by human hands, as well as the distinct characteristics of the landscape: humidity, groundwater, snow, soil, plants. Place, regionalism, and also the Shinto idea of ecological connectivity are useful concepts for understanding the complicated entanglement of people and their landscapes among papermakers in Shiroishi. Following this, the key to localism in terms of fashion sustainability could be to promote regional idiosyncrasies through various economic, cultural, and political systems of value creation. Frampton's perspective offers a view of local landscapes that highlights rather than erases local characteristics and illustrates that a community and landscape can produce a material with a specific set of intrinsic characteristics. Morton's view is that human beings are entangled with the nonhuman entities in the world in a complicated system he describes as a "mesh" (2010). To Morton, a more accurate view of the world is one where human exceptionalism is avoided in favor of a way of looking at the interconnectedness of the world. In this worldview, a human being is a boundaryless member of a local ecology, contingent upon other living and nonliving things affecting one another. The world of the nonhuman is as rich, busy and complex as any human socio-political world. All local actors are involved in giving "somewhere" its unique sense of place.

In Shiroishi, after the postwar revival of the paper industry, kamiko makers expressed the history of their city by making paper garments as souvenirs of travel, rather than for wear. When I visited the studio of Satō, she showed me some samples of the garments that she and her husband made in the 1960s, during the period of renewed production of kamiko in Shiroishi. Each garment made by Satō and her generation came with a copy of the 1797 image of the kamiko shop in Shiroishi. These weren't fashion items made to be worn; the

garments were links in the chain of Shiroishi's history—with little function beyond being expressions of place and regional material culture.

To develop a perspective on interspecies collaboration and to understand how these theories can be expressed in a material-making practice, papermakers and paper clothing from Shiroishi was considered from a historical and contemporary perspective. The next section builds on these theories, and presents examples of how these interspecies collaborations can take shape now, in different landscapes, labs, and contexts.

4.4 Interspecies Collaborative Art and Design

The term "Interspecies Collaboration" denotes that the active members of a collaboration are human and nonhuman organisms—including bacteria, flora, or fauna. This could include relationships that we may not feel or be aware of on a daily basis, but that are fundamental to human life, such as bacteria in the human gut. Interspecies collaboration is a term that has been used to describe a methodology for practices in art or design that go beyond biomimicry to question anthropocentrism by inviting nonhuman actors into the making, or growing, process. Materials and products made in an interspecies collaborative design process can be produced by navigating emergent properties between the maker(s) and their environment. In the nonhuman organism, these emergent properties can include the internal generative potential (morphological or chemical) or instinctual creative inclination (behavior) of a living organism—like a hemp plant growing long fibers or a bowerbird constructing its eclectic nest.

At UC Santa Barbara, an elective course taught by Professor Lisa Jevbratt is offered in the Visual Art Department titled "Interspecies Collaboration," in which students are encouraged to work with nonhuman partners in creating their work. In this course, animals have been used as collaborators in material selection and form, and co-choreographers for

dance performances. In this method, the relationship is itself a medium, and through reciprocal trust, coaxing or subjugation, artworks and designs come into existence.

Collaboration can be a broad term, especially if emergence is the vehicle of interspecies creative partnership. Internal or instinctive generative abilities can be shaped by human activity to produce materials which benefit both human and nonhuman actors. Anthropogenic *terra preta de Índio* soils in South America, for example, also called Amazonian Dark Earths, are believed to have been produced by agriculture and other human activities over the course of multiple generations (Glaser and Birk, 2012). These patches of soil were found in otherwise unfarmable land in the Amazonian Rainforest, and remain fertile and rich in nutrients as the human-introduced bacteria continue to multiply and expand in the soil, creating a landscape beneficial for human and nonhuman inhabitants.

At the bacterial scale, potential collaborators are not hard to find: In our bodies are billions of resident bacterial partners for collaboration. Fermented foods like sauerkraut, *nuka*, *sake*, and cheese are embodiments of pet-like relationships of care for bacteria—some of which comes from the hands of makers—and such foods can produce positive results in our bodies. Nata de Coco, for example, is a low-calorie health food made from the internal generative potential of the bacteria called *acetobacter xylinum*. This has a low environmental impact (Zhijun et al. 2014) and grows like sourdough or vinegar, meaning that bacterial "mothers" can be easily separated and propagated. When fed, it produces a material of controllable thickness on the surface of the nutrient bath in which it lives. Similar to tapa cloth in the Pacific Islands, the paper-like material used for body coverings made from the bark of the kōzo tree, the skin produced on the surface of the nutrient bath can be dried, dyed and used as-is, for numerous applications, including food, cosmetics, papermaking, acoustics, and optics (Zhijun et al. 2014). For more than 40 years, University of Texas professor R. Malcolm Brown has been studying acetobacter xylinum and algae for their potential

applications in burn therapy, bandages and even as flexible electronic screens (Czaja et al, 2006; Shaw and Brown, 2004). This bacteria is potentially capable of growing materials that can be used for fashion as well. Research Fellow at Central Saint Martins, designer Suzanne Lee has experimented with it and produced a research project called BioCouture, where she encourages people to experiment with it. Though still not feasible as a fashion fabric as it is quite brittle, has a smell, and cannot get wet, perhaps through further experimentation and development, the right conditions can be found to promote the bacteria to grow a suitable biofilm that can be used for clothing.

Bacterial biofilm is being studied at Harvard University's Wyss Institute of Biologically Inspired Engineering. This lab works in biomimetics and synthetic biology, creating engineering projects based on morphologies and processes found in nature. Researchers at the institute recently published proof of concept of a self-healing biofilm, made from a genetically engineered E. coli bacteria, which may be used for textiles, pharmaceuticals, and therapeutic treatments (Wyss Institute, 2016).

The above-mentioned examples of bacterial cultures are grown in labs, and therefore come into form under strict environmental conditions, and with human interaction dictated by the procedures of the lab. It goes without saying that throughout the history of scientific endeavor countless nonhuman organisms have been tested upon, manipulated, and changed through human actions—in an asymmetrical relationship predicated by human dominance of nonhuman organisms. However, this study will focus only on collaborations that deal with making and growing of material or form. This kind of collaboration goes beyond the logic of resource extraction and processing into textiles, and raises the possibility of working with organisms that will bestow upon a final product a unique terroir or identity, as in the case of cheese or wine (Erikson and Bull, 2017). Any interspecies collaboration that uses emergence

as a vehicle is mediated by the environment in which the collaboration takes place, so it follows that even in a lab environment it is possible to navigate emergence to attain terroir.

Lining Yao, PhD Candidate in the Tangible Media Lab at MIT, has recently presented the results of her research into new biotextiles (BioLogic 2016). Yao describes her BioLogic project as "growing living actuators and synthesizing responsive bio-skin in the era where bio is the new interface. We are imagining a world where actuators and sensors can be grown rather than manufactured, being derived from nature as opposed to engineered in factories" (BioLogic, 2016). She designed a dance costume on which she printed her bacterial actuators—dried cells that become rigid when sweat touches them, thereby opening small windows on the textile to allow a dancer's skin to breathe. This garment cannot be washed, and would require a lifestyle design in which a user would need an inoculation and incubation station in the home to re-apply the bacteria between uses. Though it is not ready to be taken to market, her BioLogic textile serves as an example of the potential for new applications of living organisms in clothing for functional or aesthetic purposes.

Japanese artist Aki Inomata is a member of MetaPhorest and uses the internal generative potential (morphology) and instinctual creative inclination (behavior) of living organisms in her work. In her 2014 work, "I wear the dog's hair and the dog wears my hair," she collected her dog's fur to make yarn, which she wove into cloth on a handloom to make herself a cape. She then made her dog a covering out of human hair. This work magnifies the negotiations inside our bodies, in which we exchange matter with other organisms for mutual benefit. Her most well-known work spans from 2009-2016 and involves 3D-printed miniatures of famous "human structures" for hermit crabs. These crabs, oblivious to the shapes of Dutch windmills, or the Colosseum of Rome on their backs, lived inside these forms as shells, carrying them into the ocean where they will be shared in an endless cycle between growing crabs. This crab-house work places the artist as a link in the chain, and

echoes how we interact with animals through our seemingly passive actions—a plastic bottle cap, for example, can end up in the ocean and become part of the nest for an undersea creature. Inomata's work shows that these acts can be beneficial, or at least acts that create beauty if they are controlled and intentional. In her 2012 piece, "Girl, Girl, Girl…," Inomata cut human dresses into scrap material from which female bagworms could make their colorful cocoons. Her interlocutions between humans and nonhumans show the possibilities of collaborating with other species in art and design (Inomata, 2014).

Hierarchy is a fundamental issue that arises in any collaboration. This issue is manifold when the collaborators are already mired in a historical relationship of dominance and subordination, such as that of humans and nonhumans. Choksi (2010) criticizes artistic investigations of this nature for not providing a clear description of hierarchy—by not doing so, they ultimately favor the human perspective; historically the human has enjoyed privilege, and the nonhuman has been subjugated by various ideological, religious, cultural, economic, industrial or political schema. These artistic investigations have also been criticized for not clearly stating *why* such collaborations are necessary or important (Choksi 2010). The interspecies collaborations of artists and designers is experimental and often results in failure, as their work is dependent on nonhuman collaborators with whom it may be difficult to "communicate" with easily.

A forced collaboration that was rejected has been explored in artist Nina Katchadourian's 1998 work *gift gift*. In this work, she fixes holes in a spider's web as a gift, but finds that the threads with which she fixed the holes are ejected from the web. Despite her intention, her gifts are tossed aside by the spider. Her work serves as a metaphor for the way that humans clumsily interact with the organisms in nature, often unaware of the implications of our actions, which often serving our only own needs (Moody, 1999). How can designers

and artists test the boundaries of hierarchy, agency, and making-in-growing in interspecies collaboration?

A way that designers and consumers can explore the feasibility of this approach is through access to tools and information. Advanced but affordable forms of technology are becoming widespread in the developed world, including the tools for doing basic genetic manipulation (Gaudi Labs, 2017). In addition to online databases and forums where people can exchange information and even take classes on "biohacking," physical locations around the world allow exchange and experimentation for aspiring and experienced makers. This hacker practice, called DIYbio, has produced many new ideas, materials, and methods; however, it is not without its dangers and ethical pitfalls. Free from oversight and a rigorous methodology, these DIYbio pioneers are in a position to work around the ethical codes respected by biologists working in institutional labs.

Places where young researchers can experiment are popping up around the world. In Brooklyn, New York, Genspace is a studio where biologists, engineers, artists, and designers can experiment with biohacking, which involves altering the physiological properties of living organisms. When it opened in 2009, the lab was said to be a modern-day equivalent of the Silicon Valley garages where 1970s computing pioneers developed their systems (Kean 2011). With the goal of creating a space for people to work on creative experiments outside of institutional labs, Genspace borrows from the FabLab co-operation and tool-sharing model pioneered by MIT in 2006. Similar labs where cross-pollination and interdisciplinary collaboration are the norm have opened in other cities around the world. In Amsterdam, The Waag Society runs an open-source wetlab for DIYbio experiments, and a biolab has recently opened in Tokyo, instigated by the MetaPhorest Bioart research group, an international group of artists, founded by Hideo Iwasaki, who works with living organisms (MetaPhorest, 2017).

Iwasaki, a bioartist and Professor of Biology at Waseda University, has been researching the intersection between art and biology for the past decade. One notable work is his 2015 piece for the Kenpoku Art Fair, in which he erected a monument to the bacteria that supports scientific research. For context, at Waseda University where he is a professor, the faculty holds an annual remembrance ceremony for the lab animals that were used in scientific research, so this was his response to their lack of recognition of their smallest-scale collaborators.

Despite the advances in interspecies collaborative methods, theory and access technical facilities, it may be some time before we see garments spun by spiders, or grown by bacteria in at-home vats. But researchers and artists engaging with interspecies collaborative methods are suggesting how changing notions of nature might enter into art and design practices—and eventually fashion, too.

4.5 Chapter Conclusion

Paper is a unique material for fashion design in that it has a multiplicity of meanings and contexts. In the West in the 1960s, its use in fashion represented a lack of ecological awareness highlighted by its impermanence and disposability of mass produced paper dresses, yet in Japan it connects a longstanding regional histories, and is a manifestation of the soil, climate, and aesthetic tastes of a region. By reframing the traditional practice of Japanese papermaking within the context of social design and ecology as a kind of proto-biodesign, the potential can be seen for biotechnology to offer new possibilities for fashion production and consumption that are local, small-scale, and community-based.

The Anthropocene is redefining our relationships with nature. The longstanding Cartesian boundary between humans and the bigger, infinitely complex natural world is shifting, and artists and designers are responding by developing new methods that traverse

the species divide. This chapter explored RQ 2: How can fashion be designed and produced in communities that include nonhuman organisms? This chapter suggested that the phenomenon of emergence is a core vehicle for interspecies creative collaboration. Through the example of papermakers in Shiroishi, Miyagi Prefecture, this chapter demonstrated that there are ways of making and growing that destabilize the human-nature hierarchy, and that these examples might be used order to develop perspectives on material making in extended communities that include nonhuman organisms—in other words, negotiating new ways of designing with Earth, rather than of it, and exploring ways that emergence can be a vehicle for design. This aim was explored by asking the following question: can nurturing and forming, as opposed to extracting and processing, inform a method for making fashion?

The core concepts of this study are examined through papermaking and paper clothing in Japan, and this chapter suggests that communal material-making communities can be seen as a model for proto-biodesign. This chapter promotes interspecies design strategies that could inform sustainable fashion, and argues that models can be found in longstanding papermaking practices which bridge technological and social innovation at the margins of contemporary centers of cultural production. Research into local material flows and community structures—such as those used to produce kamiko in Shiroishi, Miyagi Prefecture—could aid in the formation of adversarial design strategies for sustainable fashion production and consumption.

Many of the theoretical facets of this study are made visible through an observation and analysis of Shiroishi's paper clothing culture: paper clothing is the emergent product of the relationship between the maker, the material and the environment, the landscape, in which they are located. To make this argument robust, theories on localism and regional peculiarity, including Relph's (1976) "place and placelessness" in tandem with Frampton's (1983) definition of "critical regionalism," were used to consider Shiroishi's paper clothing,

and to develop the idea that *terroir* can be found in textile materials much in the same way that it can be found in wine and cheese. This implies that local characteristics can be grown into the cloth.

The goal of this chapter was not to promote an elitist system of fashion creation based on regional exclusivity, nor was it intended to contribute to a method for material and form creation that further strengthens human primacy and results in exploitation of nonhuman organisms. Rather, it aimed to present research that could contribute to design strategies and perspectives on materials, form.

Chapter 5 - Conclusion and Discussion

5.1 Thesis Summary and Findings

In the context of the Anthropocene, it is increasingly evident that the modernist processes of unrestrained growth and resource use are dangerous. The role of the dominant fashion industry, which intensively uses natural resources, must be clarified amid anthropogenic climate change.

Sustainability is a growing concern, and even a trend, in the dominant fashion industry, and will become a necessary part of design in this new age. New production methods, such as zero-waste cutting, weaving, spinning, dyeing, and disposal, as well as post-consumer strategies such as recycling, repurposing, and sharing/lending, have already been developed in response to an overwhelming amount of research calling for fundamental reforms in the industry (Fletcher 2016, 2015a, 2015b, 2014, 2012, 2010; Rissanen and McQuillan 2016; Collet 2015; Rissanen 2015; Esculapio 2014; Black 2013; Ballie; 2013; 2012; Caniato et al. 2012; Clarke 2008; Beard 2008). However, there is no agreed upon method about how to achieve these reforms, and no global standard on how to produce and sell apparel ethically. Literature on the topic identifies three key areas for possible reform: the supply chain, design, and end-use. Research on supply chain sustainability focuses on producers mitigating unethical and unsustainable practices, while research on sustainable design focuses on technical solutions such as novel cutting techniques that reduce waste. Research on end-use (fashion consumption) has been less clear. The literature shows that although responsibility is placed upon consumers to make ethical decisions at the purchase stage, they do not have access to the sites, materials and tools of production to be able to effect more substantial and lasting systemic changes.

Aimed at informing consumer-led methods of making fashion in the Anthropocene, this dissertation presented a new theoretical and conceptual framework for making material and form that emerges from collaborative communities of humans and nonhumans. There is a breadth of research and practice that deals with interspecies engagements, but so far, no formal theoretical frameworks or methods have been developed for fashion. This research sought to fill the gap by developing a framework that combines the consumer-led practices of the "sharing economy" with interspecies collaborative approaches. To this end, this study made the argument that any new framework for developing sustainable fashion methods—specifically interspecies design, in this dissertation—must address two key hierarchies that underpin unsustainable practices: the primacy of the producer over consumer, and the dominance of the human over nature.

To make an argument for interspecies design, this study considered the nonhuman organisms that animate fashion first by looking at designers and artists who are already working with new frameworks by collaborating with nonhumans, and to challenge the growth-and-progress-focused modernist paradigms that instigated the Anthropocene. This study endeavored to bridge emergent interspecies methods of bioartists and –designers with much older forms of proto-biodesign, such as papermaking.

Japanese papermaking, used to make garments and other daily life objects, is a model of community-based interspecies design that doesn't ascribe to the producer-consumer and human-nature hierarchies. The analysis of data gathered in six Japanese papermaking communities during 2016 and 2017 elucidated ways of making that problematize these hierarchies, and that can provide pathways that circumvent fashion's black box. In other words, the analysis showed that a framework can be developed for making in extended communities that include nonhuman organisms by negotiating new ways of designing *with* Earth, rather than *of* it.

In chapter 1, “Hierarchies in Fashion: Producer over Consumer and Human over Nature,” two of the fundamental hierarchies the dominant fashion industry is contingent upon—producer over consumer and human over nature—were defined and explored to promote a conceptual and theoretical framework for fashion design that is predicated on human and nonhuman communities. In questioning the dominant hierarchies, particularly those that underpin unsustainable practices in the dominant fashion industry, Arthur Koestler’s (1967) concept of “holarchies” was presented as an alternative to the conceptual limitations of hierarchical thinking This alternative is animated by “holons,” or small-scale, self-contained-yet-connected parts of a larger whole. In the context of this study, the holon was presented as a way of framing consumer-led design and production initiatives. Insights from Stengers (2010) were used to develop this perspective, and to justify the inclusion of nonhuman organisms in any holarchy.

Chapter 2, “Designing Utopia: Bridging the Technological and Social,” outlined the historical background and context for the study by exploring the implications of the Anthropocene on the discipline of design in general, and on sustainable fashion design specifically. In the first part of the chapter, design is shown to have developed from a technology of need-fulfillment to a technology of desire-creation, and now into a tool for social criticism and speculation on the future.

To more fully understand how the two hierarchies at the center of this study relate to sustainable design, it was important to look at the history of social and ecologically conscious design by following a vein of literature beginning with 19th-century utopian thinking, then widening the scope to include environmentally-conscious design of the 1960s, more recent speculative design narratives, and design for social innovation. The central thesis of this chapter is that socially just and environmentally sustainable design needs to bridge the technological and social realms, and consider organisms beyond the human.

Chapter 3, "Do it *Yourselves*: Consumer Agency Through Community," aimed to show that socially just and environmentally sustainable alternatives to the dominant fashion industry can be consumer-led, and emerge from projects and proposals that problematize the producer-consumer hierarchy. The chapter reviewed emerging interdisciplinary projects and ventures aimed at empowering consumers to reclaim their agency. Three core perspectives were extrapolated from the literature surrounding consumer-led design and production: collaboration, openness, and transparency. Significantly, this chapter also showed that some consumers are finding ways of reclaiming their agency in the top-down fashion industry. These consumers are making things in communities: they are sharing, collaborating or taking part in the design process, and becoming consumer-producers by occupying simultaneous ontological positions in relation to fashion.

An analysis of data gathered during site visits to papermaking towns in Ogawamachi, Mino, Echizen, Kurotani, and Tosa identified various scales and forms of community-based making. Papermaking cannot be made alone, and even with mechanization it requires a collaborative effort to produce. The analysis of the locality specific methods of each site visited showed that contemporary values of collaboration, openness and transparency were all evident in handmade papermaking, and can provide models for resource use, community structure, tool-sharing, co-operative associations, and stewardship of local ecosystems.

The values of collaboration, openness and transparency were shown to be vital in developing new methods for community-based design practices that bridge the social and technological aspects of design, and can also be used to understand the potential for interspecies collaboration in art and design. By using these perspectives to look at contemporary projects and papermaking, which is a longstanding making practice, this chapter shows that community-based production can be polysemic and multiscalar, giving it

the flexibility required to contribute to the development of novel fashion design methods in the Anthropocene.

In chapter 4, "Growing Fashion Through Relationships with Nature," the findings of the previous chapter were expanded by questioning community-based making practices in art, design, and papermaking to understand the processes and products of a creative community that includes nonhuman partners for making. In this chapter, real-world examples of makers who destabilize the human-nature hierarchy were documented and analyzed.

The aim of this chapter was to reflect on methods of making that problematize the human-nature hierarchy to develop perspectives on material making in extended communities that include nonhuman organisms. In other words, negotiating new ways of designing *with* Earth, rather than *of* it, and exploring ways that emergence can be a vehicle for design. This aim was explored by asking the following question: can nurturing and forming, as opposed to extracting and processing, inform a method for making fashion?

To answer this question, the theory and practice of interspecies collaborative art and design were explored by problematizing the dualist worldview, and then arguing that emergence could be the core vehicle for interspecies collaboration. The above question was then considered through contemporary interspecies art and design practices as well as fieldwork in the Japanese paper clothes-making community of Shiroishi, Miyagi Prefecture.

These inquiries into both burgeoning and longstanding practices helped lay the groundwork to propose that *terroir* can be found in textiles in much in the same way that it can be found in foods such as wine and cheese. This contributes to the argument that adversarial, small-scale fashion strategies can be developed in local landscapes resulting tight relationships between people and their landscape.

The emergence of terroir in materials that are made in local landscapes with communities of human and nonhuman actors was framed by the theories of Edward Relph

and Kenneth Frampton. Relph's "placelessness" and Frampton's "Critical Regionalism" were used to show that the paper textiles from Shiroishi are materially linked to the local landscape, and that they have *emerged* from the relationship between the papermakers and the nonhuman organisms—paper mulberry trees, in this case—they work with. It was shown in this chapter that interspecies relationships produce materials and form through the process of emergence, in which all actors involved exert energy into the final product.

In conclusion, the Anthropocene invites radical propositions for alternative fashion design practices that will restructure the fashion industry in sustainable and ethical ways. This dissertation addressed this need by developing a novel framework for bottom-up system change. Scholarship on collaborative methods for sustainable fashion design fails to address the possibility of consumer-led interspecies collaboration. This present study showed that this is a viable method, and provided the theoretical framework for justifying such a method for fashion design. Further, this study demonstrated that the pairing of social and technological innovation is vital to such methods for fashion design in the Anthropocene because it enables new means of overturning the two fundamental hierarchies of the dominant fashion industry—producer over consumer, human over nature.

This dissertation also discussed the ways consumers, acting as producers themselves, can address systemic changes, not by altering purchasing behavior, but by developing pathways to consumption that open fashion's black box, to gain access to the sites and materials that animate fashion. These pathways can be successfully built by consumers using collaboration, openness, and transparency.

The original contribution of this study is the development of a framework essential to formalizing interspecies collaborative design by consumer-producers. This research provides the foundation for sustainable interspecies fashion design in the Anthropocene—a form of

design that address systemic issues in the fashion system, and which acknowledges the entanglement of nature and fashion.

5.2 Discussion

Fashion thrives on novelty, and the concomitant ease with which trends and garments are disposed has spread to the offshore locations where fashion is made. Since the mid-20th century, sites of production have been moving further and further away from the designer's workshop, and textiles have become disconnected from the landscapes that generated them—moving in one direction, away from their natural sources. These shifting sites may enable consumers to have a greater range of purchasing choices and lower costs thanks to economies of scale, but has led to an unsustainable demand for the products generated by the modern fashion industry.

Modernity is embodied in fashion not only through dress—new materials, shapes and colors—but also through structures of production and consumption, specifically the way the fashion industry transforms the natural world. Hierarchical relationships that facilitate subjugation and exploitation are not unique to fashion but have been longstanding practices in human culture, and may be the cause of future environmental problems.

How will fashion from the early 21st century, potentially the beginning of the Anthropocene, be historicized? On the one hand, the 21st century could be considered a time of great innovation, as styles, references, new materials, and novel commerce strategies proliferate. On the other hand, the rate of production demanded by the industry has led to the implementation of unsustainable industry practices—offshore production in ethically dubious factories, and the deterioration of existing vernacular textile and apparel industries. Concurrently, certain educators, researchers, and designers are passionate about finding a balance between consumption and extraction in the fashion industry. So perhaps, this period

will be historicized as one when the march of advanced capitalism and destructive resource extraction was halted, and when both researchers and designers took a critical look at industry practices to develop a more socially just and environmentally sustainable fashion industry. Perhaps historians will look back on this time and reflect on the positive changes that were made in reaction to the unchecked industrial progress of the 19th and 20th centuries, and see that the Anthropocene can be a tool—a crowbar—that cracks open the black box of fashion and helps to reframe the relationship between fashion and nature.

There is no panacea for the social and environmental issues that are part and parcel with the dominant fashion industry. This thesis is neither a comprehensive prospectus for environmental sustainability in the industry nor a rigorous philosophical treatise on the aesthetics of synthetic biology or human-nonhuman relations. Rather, it was intended to contribute to the discussion around *alternative* fashion-production systems, and to the development of novel methods for fashion design that empower the consumer to consider utopian visions as a driving force for action.

The "alternative" envisioned in this research is clusters of small-scale consumer-producer maker communities in which people *grow* materials and form for fashion with nonhuman partners. These partners could be animals, insects, or bacteria, as in fermented Japanese foodstuff like *nuka* (a fermented bacterial pickling agent) and *kōji* (a microbe used to make miso, sake, and soy sauce), which can be propagated easily, or plants, like kōzo. The consumer-producers would connect online, share recipes and care tips, just as any community of networked makers would. The difference, however, would be that such material-making practices would be the result of interspecies relationships that are embedded in a local landscape, and therefore no two materials would be the same—a *terroir* in materials for fashion could emerge from these holonic relationships.

This study is not proposing an acceleration towards a techno-topic future, nor a return to premodern pastoralism. Environmental sustainability does not have a purely technical solution, and unless a cataclysmic event ends all human life, there is no future without technology. Even in an extinction event, the Anthropocene shows us that the results of human actions via technology may echo far into the future, in manmade traces legible in geological layers.

A look back at social structures in extant material-making communities, papermaking in this case, to see how communities of human and nonhumans can produce materials and form together shows us how fashion designers can develop methods that similarly reframe our relationship with nature and that enable the emergence of form, color, sound, and texture with nonhuman partners.

5.2.1 Limitations of the Study and Recommendations for Future Research

This thesis explored the theoretical possibilities of interspecies collaboration for fashion design. The fundamental premise of this study—investigating the relationship fashion has with nature and proposing alternatives to the dominant fashion industry—has implications that are beyond the scope of this dissertation, and there are several future pathways for investigation. The theoretical dimensions of the research method were anchored to the real-world practice of Japanese papermaking, and because of this, both theoretical and practice-led questions emerge that can inform future research. These questions emerge from the limitations of the research, which will be outlined below.

There is an inherent contradiction in researching traditional crafts to contribute to environmentally sustainable fashion studies because many crafts themselves are economically unsustainable and currently supported by regional governments. The economic precarity of papermaking stems from the fact that washi no longer plays a meaningful role in the everyday lives of people. Kamiko and shifu, and paper garments of all kinds, have fallen

out of daily use, and even their contemporary iterations are novelties produced for domestic tourists in Japan. While examinations of traditional practices may offer vital information about how we can live in a reciprocal, balanced relationship with our local landscapes and natural systems, traditional craft may not be able to provide us with definitive clues regarding means of developing novel and sustainable *economic* systems. The interspecies methods outlined here can contribute to environmental sustainability through community-led collaborative fashion design, as evidenced in Shiroishi, through a balanced relationship with the local landscape, but more research is needed to quantitatively confirm how these methods can be transferred to other locales. A thorough comparative study of the various methods and community structures employed in papermaking communities would be beneficial in formalizing a method for small-scale interspecies fashion design. Indeed, the natural progression of this research is the development of methods based on the proposed framework which are situated in a real place involving an interspecies community of makers.

The findings from Shiroishi and Kurotani showed that a thorough, critical examination of the history and contemporary socio-economic contexts of use of kamiko are needed. There are several books published on the topic, but there is no definitive text written in English, and nothing published in the last 40 years to show how the craft has developed. Although it is historically contextualized in this dissertation, a deeper and more thorough study of kamiko was not included as it was beyond the scope and aims of this study; however, such an examination would have strengthened the analysis. Kamiko, although no longer part of everyday life, still possesses possibilities for expression in form and material. Along with a historical survey, an exploration of paper-treating methods and techniques for form-creation for contemporary kamiko is one of several possible practice-based research pathways that emerge from this study.

The theoretical framework outlined in this dissertation needs to be tested, expanded, and allowed to grow in various contexts and landscapes around the world. The principle of emergence used as a tool for design, as discussed in chapter 4, could provide the conceptual underpinnings for physical experiments and practice-based research projects. Oxman's (2013) work already provides a robust theoretical and exploratory basis for a study of how emergence can be mapped and wielded digitally to produce forms based on material characteristics and how these interact with environmental inputs. For fashion and textile designers, the expansion of the productive capability of the nonhuman organisms in the world, from passive participants to active players in the process of making, could open new pathways for both social engagement and expression. This could be used to develop a library of new materials and forms as well as interspecies processes that produce them. This would require a lengthy study of a wide range of interspecies engagements that produce materials or forms.

The time and content length allocated to this study did not allow for a comparison between washi and other material-making practices in Japan. Further, there are many materials in Japan with similar characteristics to washi, such as linen, silk, and leather, in that they are produced communally and made from natural materials. Silk, for example, is made by harvesting the cocoon of the silkworm, and historically has been a thriving cottage industry. A study with one of these materials could test the framework outlined in this study, and contribute to the development of interspecies methods for producing materials and forms that embody the place in which they are produced.

The placeness, or terroir of a material isn't easily quantifiable. Furthers methodologies need to be developed that can examine locally contingent methods of making textiles for fashion design that both intrinsically and extrinsically express the landscapes and relationships from which they emerged. Further research along this line of thinking would

consider the ways that a local ecosystem—including humans, the landscape, and nonhuman entities—could produce region-specific textile materials.

5.2.2 Contribution and Final Reflection

By developing a theoretical and conceptual framework to help understand the relationship between human and nonhuman organisms in a material-making or fashion design process, this dissertation contributed to the growing academic discussion on sustainable fashion, and to the development of design methods for sustainable fashion. There is much scholarship on methods for sustainable fashion design, but this dissertation fills a gap in the research: linking biodesign, handmade craft practices and fashion sustainability. An initial goal was finding a means of connecting new developments in bioart and biodesign to fashion design through physical experiments. Instead, after completing part of the literature review, it became apparent that there was no formal framework to understand and inform methods for interspecies design in fashion, and that the development of such a framework would reveal some of the foundational issues preventing sustainable practices in the dominant fashion industry.

This dissertation showed that consumers, acting as producers, have been developing their own pathways to consumption that break open the black box of fashion production and are seeking collaboration, openness, and transparency regarding the sites and materials that co-constitute fashion items. This study connected three seemingly distinct fields of inquiry: sustainable fashion, paper, and the Anthropocene. However, if each of these fields is defined differently—as clothing, craft, and ecology—it becomes clear that they are deeply interrelated.

Based on an investigation of leading research into sustainability in fashion, Catterall (2017) argues that "radical and systemic changes will be needed and can arguably be introduced more effectively from the ground up by multiple independent actors." However,

there is a lack of research into consumer-led change in the dominant fashion industry. To promote systemic changes, this dissertation argues that a deeper understanding of the theoretical and conceptual frameworks that underpin the unsustainable and unethical practices in fashion is required—it is not enough to talk of mitigation, minimizing usage, or designing better.

Through a deeper understanding of the fashion industry's biases, a fundamental re-assessment of fashion's relationship to nature can be achieved, and from this new frameworks and methods of production can be developed—frameworks more appropriate for the epoch we live in. In other words, through reframing an extant and longstanding practice like papermaking using contemporary perspectives developed from consumer-producers—such as interspecies collaboration, openness, and transparency—this study provides a framework for nascent design practices that seek to bridge the biological, social, and technological in the Anthropocene.

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