Using the Process of Reproduction to Extract Tacit Knowledge from Historic Garments

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Abstract

This project consisted of two integrated objectives. The first objective was to develop a method to study the sewing skills and tacit knowledge required to make historic garments. The second was to determine what changes in tacit knowledge and sewing skills were required by seamstresses during the 1910s and 1920s, a period where the custom-made clothing industry rapidly declined, and the ready-to-wear industry reached maturation.

These two goals were achieved by studying two dresses, one from the 1910s and one from the 1920s, in a six-step process. First the primary garments, along with ten additional comparison garments, were thoroughly documented, inside and out. Then the primary garments were compared to the additional garment to establish that they were constructed in a typical manner for their time. Next a series of experiments were performed, in the form of drafting patterns (Appendix D) and making toiles and fashion-fabric technique samples of the primary garments. This information was analyzed using a material culture framework. Next, fashion-fabric reproductions of the primary garments were constructed while keeping notes and a detailed log of every physical and mental part of the process. Last, the log data and notes were analyzed to highlight changes, challenges, and the unexpected.

This study found that there was some loss in sewing skills needed to construct garments between the 1910s and the 1920s, however, most of the tacit knowledge

required remained unchanged. The method used was deemed to be overall effective but could benefit from further adjustments and refinement.

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Chapter 1: Introduction

There is something incredibly intimate about handling old clothing, particularly in a museum setting. That context invites you to speculate on the life of the object and all who interacted with it along the way. In an article written for The Atlantic, costume curator Kimberly Chrisman-Campbell calls touching the clothing of the long dead an intimate and almost transgressive act, one in which the ghosts of those who wore the garments can be felt and small traces, such as the odd stain or strand of hair can be found (2017).

Most people seem to think primarily about the person who wore the clothing. This is understandable. Garments are often presented to the public as "the dress worn by so-and-so" or "a suit worn during this-famous-event." Additionally, most people interact with clothing as consumers, as wearers. Making clothing is now primarily the domain of factory workers in faraway countries and hobbyists.

It is the act of making, however, on which this dissertation will focus. This is an attempt to understand and illuminate the act of creating these objects that become so personal. This research differs from previous research through its focus on the skills, actions, and expertise of the *maker*. Previous research has concentrated on the shape and structure of the *garments*, as well as the life and physicality of the *user*.

Purpose of Research

"Can you make a dress in an hour?" I was asked by my supervisor in the spring of 2016. I was working as a collections assistant at Michigan State University Museum, an institution which houses a wide variety of historical and archeological artifacts, including several thousand pieces of historical dress. An exhibition of 1920s women's clothing was on the schedule and the curators were working on developing related programming. The event I was asked to participate in was a reenactment of a demonstration promoting home sewing that had been performed at department stores throughout the U.S. in the mid-1920s. I was to make a 1920s style dress from whole cloth to wearable garment in one hour, in front of a live audience.

I took a few days to consider the proposition. On one hand, I had plenty of experience sewing and was confident in my technical abilities. I could even work quickly when needed, a skill honed through jobs in bridal alterations and theater costuming. But I had never sewn while being watched. Certainly not while being timed. However, I was intrigued by the idea of not just reproducing a historical garment but reproducing the *experience* of making that garment.

Preparation took several months. First, I needed to decipher the 1920s instructions, which turned out to be more difficult than anticipated. There was no pattern, just a series of measurements. There were a few illustrations of the process, but the majority of the information was just text. This text assumed large amounts of additional

knowledge about early 20th century garment construction methods and norms. In most cases, being an experienced seamstress allowed me to fill in the gaps, but there were still some things that I found perplexing. That is, until I stopped reading and started to sew. It was through this experience that I realized that, by adding the element of doing, I could both find problems that needed solving and come up with solutions.

It was because of this experience that I knew I wanted the act of making to be a part of my dissertation. However, to be a topic worthy of being academic research, I would need to have a reason for my research that was more than just that I found it interesting. I strongly felt that what I wanted to do was valuable, but I was unable to find the right words to express it. I needed to identify my higher purpose, how this sort of work could do more than satisfy my own curiosity.

That purpose presented itself when I started to think and learn more about the lives of those who are sewing our clothing today. My starting point was the popular documentary *The True Cost* (Morgan, 2015) which documents the inhumane conditions that many garment workers face globally. Pay being well below a living wage, long hours, and dangerous factory conditions are all endemic to the industry. A focus of the film is the Rana Plaza collapse, which was one of the worst disasters in the history of garment making. Over 1,100 workers were killed and many more were injured when the building, which was full of people sewing clothing for export, collapsed in 2013 (Bowden, 2014). However, this was not a natural disaster, but a manmade one. Rana

Plaza had been hastily constructed and was intended for use as a shopping center. The resulting structure could not support the heavy equipment used in garment manufacturing. This became clear in the days before the collapse when visible cracks appeared in the walls of the building. The workers, however, were still required to come into work (Pouillard, 2019). While this disaster was widely reported on when it first occurred, not much has changed in the intervening years. In early 2019, Bangladeshi garment workers went on strike to protest many of the same conditions that led to the Rana Plaza disaster. They demanded higher wages and better working conditions, because five years after the disaster there had been little real improvement in either of those areas. This is in spite of the fact that Bangladesh is one of the largest exporters of apparel, second only to China (France-Presse, 2019).

Unfortunately, this is not surprising. Since the beginnings of ready-made clothing in the seventeenth century, the workforce has been mainly female, and these women were always paid poorly (Levitt, 1991). The tragedy of Rana Plaza bears striking similarity to another famous disaster that occurred just over 100 years prior. On March 25th, 1911, in New York City, the Triangle Shirtwaist Factory caught fire, resulting in 146 deaths, mostly young women. The high death toll was similarly the result of employer disregard for workers. Most of the doors had been locked, ostensibly to prevent theft and unauthorized breaks, trapping the workers inside. If the doors had been open, most, if not all, of the workers could have made it out of the building (Pouillard, 2019).

The Triangle Shirtwaist Factory tragedy has been credited with contributing to the passage of laws regulating the safety of workplaces and the rise of garment workers unions within the United States. However, the use of sweatshop and other abusive forms of labor has remained endemic, coming back in waves, even in western industrialized countries. The structure of fashion production, which often relies heavily on sub-contractors combined with the increase in offshoring, makes it difficult for even well-meaning companies and consumers to know where their clothing is made. Historically, the biggest hindrance to improving worker conditions hasn't been the passage of regulations, but the ability to audit the factories and enforce the laws. It is this obfuscation of responsibility that allows abusive labor practices to flourish (Pouillard, 2019). As Sara Tatyana Bernstein said in a Costume Society of America roundtable titled *Engaging Labor, Acknowledging Maker* "we all know that capitalism works best when labor is invisible" (Mamp et al., 2018).

So, I began looking for ways to render this labor visible. I wanted to highlight the work of these workers in a way best suited to my own expertise. Because these women and their work have been so undervalued for so long, I wanted to find a way to prove that what they were doing was something of value. I wanted to show that even the simplest kind of sewing requires an expertise that shouldn't be taken for granted. However, I was unable to find an existing method for extracting and communicating this value. To that

end, the purpose of this research was to find a way to identify and make visible the skills of those who have made our clothing.

As my own past work and expertise has focused on historical sewing, it was an easy decision to focus on the past, rather than the present, for this research. After all, the basic technology that is used to make our clothing, the sewing machine, has changed little over the past 100 years (Pouillard, 2019). However, I acknowledge that there are many ways that current garment manufacturing processes could be studied to achieve this same end. Additionally, while sewing machine technology has remained stable, clothing manufacture has changed in many other ways. One of the most dramatic of these shifts has been the transition from one-off, custom-made garments to ready-to-wear. We are also in the midst of another change, one which may be accelerated by the current global pandemic. This crisis has significantly bolstered the movement to revamp the fashion calendar. In the past, there has been talk about eliminating shows for cruise collections, reducing the total number of collections fashion houses create, and shortening the time from presentation to retail. However, these initiatives seem to be picking up speed with Dries Van Noten writing an open letter calling for some of these changes in May 2020 that has now been signed by many significant members of the fashion industry (DeLong, 2020). While these changes are worthy of being studied in their own right, understanding the past may help us to process them better.

I also realized that in studying historic sewing skills there are numerous potential applications for this knowledge. The most obvious is that it can be helpful to those interested in historic costume. Be it a conservator, a theatrical costume designer, or a hobby historical costumer, identifying and codifying these sewing techniques can help them in their own work. For a conservator, this might mean understanding a garment well enough to create supports, as has been done in some studies (Hodson & Davidson, 2007) or to make repairs to a similar damaged garment. For theatrical designers, work like that proposed would give them greater understanding of authentic sewing methods allowing for a greater degree of historical accuracy in the costumes produced. While the aim of film and theatrical costumes is not perfect historical accuracy, for some costume designers and directors, creating objects within a film using historical construction methods is an important part of developing the overall feeling of a film, even if it may not be readily visible to the audience (Lees, 2016). Lastly, historical accuracy is often very important to hobby costumers and historical reenactors. Since their gear is seen up-close by those with similar interests, the small details of construction can be used as a means of attaining status and acceptance within a group of their peers (Strauss, 2001). This work, particularly if packaged with them in mind and published commercially, would allow for them to learn things about historical construction usually limited to those who are able to examine historical garments up close and in person.

Problem Statement

Today, clothing and the workers that make it are treated as disposable, as is evidenced by poor treatment of both the objects and the people who make them. There are many reasons why this work is undervalued, including that much of the knowledge needed to make clothing does not exist in any written form. Some of that is tacit knowledge, passed down through observation and practice. Other skills may have been explicitly taught but require additional tacit knowledge to execute properly. My goal was to capture the tacit knowledge embedded within and to document the range of skills and level of expertise needed to understand the role of the maker.

Research Question

This study combined aspects of Material Culture Analysis with Task Decomposition, Experimental Archeology, and Design Studies to create a new method with the aim of extracting tacit knowledge from physical objects. The new method was tested on two similar garments made approximately ten years apart. These were meant to be representative of the changes in women's clothing that took place as the making of women's dresses moved from small-scale production in the 1910s to mass manufacturing in the 1920s.

- What changes in tacit knowledge and sewing skills are required by seamstresses during this period when the custom-made clothing industry rapidly declined, and the ready-to-wear industry reached maturation?

Research Design Overview

This project has two parts, the development of a method for conducting research on historic garments through reproduction and the testing of that method on two dresses from the Goldstein Museum of Design. This involved six main steps:

- Thoroughly documenting the primary garments, along with ten additional comparison garments, both inside and out. This included taking detailed measurements and extensive photographs.
- Situating the primary dresses in time and demonstrating the typicality of their construction by comparing them to the secondary garments.
- Experimentation, in the form of drafting patterns and making toiles and fashion-fabric technique samples for the primary garments.
- Analyzing the information gained from the experimentation.
- Creating reproductions of the primary garments while keeping notes and a detailed log of every physical and mental part of the process.
- Analyzing the log data and notes to highlight changes, challenges, and unexpected findings.

Assumptions

In attempting this study, several assumptions were made. The first was that it was possible to extract meaningful knowledge about the process of making historical garments through doing. This assumption was based on several recent studies that used reproductions as a way of learning. This included a poster presentation from the 2018 Costume Society of America Conference that demonstrated how an 18th century dress could be remade in a different, later style (Dowdell, 2018). Second, it was based on the longer history of experimental archeologists using the process of making to recover lost skills and expertise as demonstrated in works like Barber's *Women's Work: The First 20,000 Years (Barber, 1994)*. Third, was that I would be able to go deeply enough into my own actions to thoroughly document all the tacit knowledge I was using. A framework for breaking down actions called Task Decomposition used in this part of the study provided a structure for capturing this information and ensured that the record was complete. Fourth, I assumed that the comparison of two garments would yield richer results than a single case study.

Additionally, several assumptions were made in the course of taking the patterns from the historic garments, drafting the patterns, and sewing the garments. These all fell under the umbrella of an assumption of normalcy. While there have been some interesting discoveries made by carefully documenting garments with unusual pieces, the

focus of the study was on the sewing, not the pattern pieces. So, it was assumed that any minor deviations in the grain or shape of pieces, as compared to extant patterns, would be the result of seamstress error or distortions during wear or storage. Instead, the choice was made to operate as if I were working as a seamstress in the same shop, using a pattern that was designed to be sewn using new, not salvaged, fabric. I was sewing a copy of the dress next to the original seamstress, not as her. This means that there was no attempt to recreate the specific quirks of the garments, rather, any mistakes and oddities were my own.

Researchers Position

In addition to the above assumptions, I also needed to acknowledge where I was coming from as a researcher. For this study I drew from three separate stores of knowledge, that of a seamstress who has made things, a teacher who has experience transferring their skills to others, and of a historical researcher who has developed an eye for reading historical garments. These three sets of skills form a base of knowledge that provided the foundation for this study.

The sewing skills were acquired from both experience and formal training. This formal training consisted of a BFA in Fashion Design from Columbia College, where I took courses including flat pattern making, draping, and tailoring. Experience was gained through both independent projects and formal employment. This primarily

consisted of work as a bridal alteration seamstress and as the lead seamstress in a theater costume shop.

The ability to break down my own actions when sewing and explain those to others was gained through teaching. At the costume shop, this consisted of training new employees how to sew, often from scratch, and helping them learn how to troubleshoot issues in a time sensitive environment. This work led to me being recruited to teach sewing and patternmaking at the college level. In both situations it was frequently necessary to identify, break down, and communicate actions that were not included in our textbook or the instructions to a commercial pattern. An example of this would be, how to hold the fabric with just the right amount of tension when guiding it through the sewing machine. In this role, I served as a link between the written instructions in a pattern envelope or a sewing book and the students. I learned how to externalize and verbalize the tacit knowledge I had accumulated through my own experiences as a seamstress.

I also came to this research as someone who has spent a great deal of time examining historic garments. While working for the Michigan State University Museum I conducted a condition survey of over 4,000 historic garments, ranging from the late 18th century to the 1980s. Being able to look closely at the inside and outside of that many garments trained my eye to understand the structure of historic garments. Observation, however, was not the same as doing, which was one of the reasons for this project.

The combination of these three sets of expertise comprised the background I believed was necessary for this project. Furthermore, I had experience combining these skills through the One Hour Dress project described above. This project, which was funded through the Michigan State University Museum, resulted in a live presentation, sample garments that have been repeatedly used by the museum, and a paper presented at the 2016 Midwest Regional Costume Society of America Symposium. While this project was not identical to the one proposed, it did demonstrate my ability to integrate the above skills at a high enough level to take on this new challenge.

It was also necessary to acknowledge that this same knowledge inevitably was also a form of bias. I was limited to what I had learned about sewing, what I could decipher from sewing manuals, and what I could figure out through experimentation. A woman sewing 100 years ago would have been drawing from a different store of knowledge based on sewing norms at the time, her own education, and her own personal biases and preferences.

Definitions of Key Terminology

Below are the definitions for a handful of key terms used in this paper. Several are discussed in more depth in the following chapters, particularly the literature review. The abbreviated definitions below are meant to help the reader begin on the same page as the researcher.

Tacit Knowledge

For this project *tacit knowledge* is defined as any knowledge or skill that may have been used by a seamstress to create the garments for study. The aim is to go much deeper than what would have been included in a basic order of operations, and to capture every possible piece of information needed to make the garments. This definition acknowledges that the concept of *tacit knowledge* can be difficult to define (Adloff et al., 2015). After all, how could we know what sewing skills were explicitly taught and what were learned either through observation or experience? At either end of the spectrum, the difference may look obvious. In the murky middle, this is a distinction without a difference. Indeed, other researchers have worked with a framework that views tacit and explicit knowledge as two facets or dimensions of the same system of knowledge (Forsman & Solitander, 2004). In this research use the term tacit knowledge with the understanding that it goes beyond the basic order of putting garments together but the acknowledgement that this information may have been written or verbalized at some point by someone.

Expertise and Skill

I use the word *expertise* to refer to the combination of tacit and explicit knowledge held by a person. Expertise can be described as the combination of two different processes: the general knowledge of the challenges and issues within a field and

the ability to access knowledge in order to problem solve or understand the progression of actions needed to move forward (Epstein, 2008). In this paper, this is differentiated from *skill* by its scope. Skills are the discrete units of knowledge needed to accomplish a single task.

Reproduction

To differentiate this project from the making of a costume or other form of dress, it is necessary to specify the criteria for the creation of a *reproduction.* This is defined here as the creation of a historical object based on evidence, with the aim of furthering knowledge (Dancause, 2006). In this case the evidence consists of garments and sewing manuals.

Functionally Authentic and Aesthetically Authentic

The term *functionally authentic* was used here to emphasize that, wherever possible, notions and fabrics were chosen that would behave in the same manner as the original. This was meant to contrast with the idea of an *aesthetically authentic* notion or fabric, which might visually appear truer to the original time period but may have needed to be sewn or handled in a less authentic manner. The function of the notions was prioritized over aesthetics because the top priority of this specific project was to learn about the process of sewing the dresses. A project with different goals may have chosen

to prioritize aesthetic authenticity instead. Neither was objectively right or wrong (see the *Authenticity: Copies and Reproductions* section of Chapter 2 for more on issues regarding authenticity).

Seamstress and Dressmaker

This project focused on making, which was primarily the realm of the *seamstress*. While there can be overlap between seamstresses and *dressmakers*, the former were typically low paid workers performing the manual labor of sewing. They could work for dressmakers, in private homes, or in factories. In contrast, dressmakers were involved in the design process, with a good eye for style and fit being part of their skill set (Amneus, 2010). While there was some overlap between the two, these classifications were commonly found in occupational or census data collected at the time, further demonstrating the distinction between the groups.

Organization of Dissertation

In this chapter, I introduce the inspiration and issues behind this project, which focuses on the extraction of tacit knowledge from historic garments. I give an overview of my research design and the assumptions and personal biases that may influence this work. In Chapters 2 and 3, I provide an overview of the literature. Chapter 2 looks at the methodological background that influenced the development of this project. Chapter 3

contains a brief history of the garment industry during the late 19th and early 20th centuries. In Chapter 4, I lay out my proposed three-tiered method for extracting tacit knowledge and the two-dress case study I used to test this method. Chapter 5 compares the two primary dresses with the ten secondary dresses to establish the typicalness of the construction used in the primary sample. Chapter 6 analyzes the information gleaned during the experimental phase using a material culture approach. Chapter 7 analyzes the information gathered during the sewing of the final garments using the Task Decomposition framework. Finally, Chapter 8 contains a summary of my conclusions related to both the method and the research question, the significance of the study, the limitations of the study, and avenues for future research.

Chapter 2: Literature Review - Methodology

The following review of literature addresses the first of two main aspects of literature that inform this project: the use of garment reproduction as a research method. The study of historical dress construction is both fascinating and complicated. Multiple disciplines converge here, including theatrical costuming, material culture, and experimental archaeology. This chapter looks at the way reproductions of dress are used in a museum setting by curators and conservators. It looks at how the popularity of reproduction work by hobbyists impacts the field and intersects with the concept of authenticity. Additionally, it looks at how different methods used in design research, material culture analysis, and experimental archeology can have an impact on the field.

Experimental Archeology

One of the disciplines that has influenced this research has been the field of Experimental Archaeology. The techniques of this discipline have been applied to a wide range of object types, but they all share the same goal of learning about how people in the past lived by recreating objects and processes from the past. Often there were large gaps in the available physical and recorded evidence, so the experimental archeologist combined the existing objects with knowledge of how the same task has been performed elsewhere in human history. The "experimental" part of this discipline derived from the

rigorous and well documented methodologies used to test these theories (Olofsson, 2015).

I first encountered experimental archeology techniques when reading about a woman who had disproven long held theories about ancient Roman hairstyles. These theories assumed that either wigs were worn or that the Romans had a similar arsenal of hairdressing tools as we do today. By using her expertise as a professional hairdresser, Janet Stephens (2008) was able to show how needles and thread - objects for which there was archeological evidence - could be used to create several different ancient styles. The author's subject expertise allowed her to formulate her theory, and the act of experimentation allowed her to provide strong evidence that she is correct.

This discipline also has allowed those with deep subject expertise to confront their own assumptions. In the classic book *Women's Work: The First 20,000 Years* (Barber, 1994), the author told the story of an attempt to reproduce a piece of plaid cloth from the Natural History Museum in Vienna. Threading the warp of the loom was a tedious process because the warp yarns were highly irregular in number. However, when she began the process of weaving, she found the weft threads to be perfectly regular. The author was perplexed by this at first, but then realized that she had reversed the warp and weft yarns. If the warp yarns were regular and the weft were irregular, a picture of the situation in which the work was done emerged. While the warp would have been carefully counted to fit within the structure of the loom, the weft would have been

inserted by the woman weaving it a little at a time between other tasks such as childcare. The horizontal weft stripes were formed by eye, rather than counting, because of the frequent interruptions. The act of making the reproduction allowed the author to correct her own preconceived notions related to the making of the cloth and gain insight into the environment within which the cloth was created.

Experimental archeology, however, is not a perfect model for experiments in 20th century garment reproduction. Textiles from before the 16th century are incredibly rare, to say nothing of completed garments (Tortora & Marcketti, 2015). An exploration of dying may start with metal dye vats (Hopkins, 2015), or an exploration of twill fabric may start with clay loom weights (Olofsson & Nosch, 2015). In contrast, an exploration of 20th century dress can start from an extant garment. The concepts and ideas behind experimental archaeology are relevant, but the exact methodologies are not perfectly compatible.

Object Based Fashion Research

Before the 1960s, historical garments were rarely found in museums. Smaller objects like accessories and samplers were common, but full examples of historical dress were in short supply. The sudden influx of garments into museums has been partially attributed to auction houses deciding to offer historical dress. Realizing there was a market for historical fashions, there was a mass clearing out of attics, resulting in a large

influx of previously hidden objects coming to light (Tarrant, 1999). The early pioneers who studied the technical aspects of historical fashion included Talbot Hughes, Norah Waugh, Nancy Bradfield, and Janet Arnold. They all worked with extant garments, to make patterns that were later reproduced in a miniaturized scalable form (Tarrant, 1999).

Looking at one of Arnold's books, *Patterns of Fashion English Woman's Dresses and Their Construction c. 1860-1940*, detailed drawings of the garments, inside and out, were found alongside pattern diagrams with copious hand-written notes. Arnold also reproduced some commercial patterns in this book and provided some sewing instructions taken from extant sources (Arnold, 1993). However, I have been unable to find any evidence that the author used this information to make reproductions of the garments.

Nancy Bryant produced a series of three papers (Bryant, 1986, 1991, 1993) on the techniques used by the designer Madeleine Vionnet, who made extensive use of the method of bias cutting. The author provided numerous diagrams of the pattern shapes used by the designer but acknowledged that the tendency of bias-cut garments to settle and stretch over time may render some of the patterns slightly inaccurate (Bryant, 1993). The most interesting finding came from Bryant's attempts to create cutting layouts using these pattern pieces. Bias cut garments are notorious for significant fabric waste. However, Vionnet was known to have extra wide fabric specially manufactured. Laying out Vionnet's designs on this wider fabric revealed that the designs could be cut with a

minimum amount of waste (Bryant, 1986). This demonstrated the kind of practical manufacturing knowledge that can be gained through doing when studying historical dress.

Around that same time, Marendy (1993) was working on a project to create a series of pattern blocks that could be used to make recreations of 1880s dresses for interpreters at a historical site. This project used a selection of different historical and modern drafting methods to create patterns which were then constructed. The resultant dresses were tried on with reproductions of period appropriate underpinnings. These were then judged by a twelve-person panel as to their appearance of authenticity. It was found that the reproductions made from graded versions of the historical systems gave the most authentic appearance. This suggested that there was a value in extracting and preserving historical techniques that were different from the act of trying to reproduce them from a modern perspective.

Also relevant is Beverly Gordon's treatise *The Hand of the Maker: The Importance of Understanding Textiles from the "Inside Out"* (2002) which makes a case for textile researchers to use making as part of their research. The process of making can be used to debunk myths and disprove theories based on incorrect assumptions. The ability to make an object is framed as a form of literacy. This allows the scholar to read the object in ways not otherwise possible. Additionally, Gordon points out that "anyone

who has tried to reconstruct historic textiles will agree that the experience generates new - and new kinds of - research questions."

Authenticity: Copies and Reproductions

Copies, fakes, and reproductions have had a place in museums since the beginning, though, authenticity has been one of the fundamental ways that museums have been able to build trust with their audiences and establish authority (Varutti, 2017). Dress and textile objects have been some of the most vulnerable objects held by museums (Lennard & Ewer, 2011) while at the same time fashion exhibits have been some of the most consistently popular, with blockbusters like *Alexander McQueen: Savage Beauty* ranked as one of the Met's most popular exhibits of all time (Mida, 2015). The concept of authenticity and the copying of designer goods has also been explored by museums, notably in a 2014 exhibition at the Museum at FIT (Downing Peters, 2016), however reproductions and copies that come from inside the museum itself carry a different sort of meaning.

There are many different definitions of the word reproduction, but the most useful one I have come across is from the Code of Ethics for the Canadian Association for Cultural Property:

> "All actions taken to recreate, in whole or in part, a cultural property, based upon historical, literary, graphic, pictorial, archaeological, and scientific

> evidence. Reconstruction is aimed at promoting and understanding of a cultural property and is based on little or no original material but clear evidence of a former state." (Dancause, 2006, p. 41)

This definition emphasizes that, for an object to be a reproduction, there needs to be some evidence to work from. The amount of evidence available may vary, but a reproduction needs to be based on something that at one point existed. This definition also has requirements for intent. Meaning that the recreation needs to be made with the intention of better understanding the object or to in some way bring more attention to it. Promotion and understanding can cover a wide array of different possible motivations and uses for a reproduction, while at the same time keeping them grounded to the everyday needs of the museum. Essentially, it means that, before embarking on the process of making a reproduction, the museum needs to ask, "what will we learn from this process?" and "how can we use the reproduction to meet the goals of our museum?"

Learning about the object is one of the two primary reasons museums create reproductions of dress (Dancause, 2006), but what are they trying to learn? Garments are usually made from a variety of materials that, over time, can deteriorate in a variety of different ways. Threads used in construction can rot even while the fabric remains in good condition, or dyes can interact with the fibers causing one fabric to break down more quickly than another. Repairing a garment can be difficult if it is unclear how it was made in the first place (Lennard & Ewer, 2011). By attempting to reproduce a

garment, the museum can learn more about how it had been made, and thus have a better idea of how to conserve it. Additionally, a reproduction garment can reduce handling during the mounting process. It's often necessary to put a garment on a mannequin and take it off several times in order to get the padding underneath right (Davidson, 2015). Copies, even a test version made of muslin, can be used to test out display mountings, significantly reducing handling. The original then only needs to be put on the mannequin once (Dancause, 2006).

Projecto Replicar at Museu Paulista at the Universidad de Sao Paulo, Brazil focused on the process of making an authentic reproduction for display purposes. This project was conceived when a request was made to put the dress on permanent display in the home of the women who owned it. The house had since been turned into a museum. While the dress was too fragile to be displayed in that manner, the Museu Paulista was concerned that by refusing the request outright they would be missing out on an opportunity to promote the textile collection. As a compromise, it was decided that a reproduction of the dress would be made for display. The process used was fully documented and presented to the public in the form of a website (de Paula, 2016).

What I found compelling about this project was that the decisions made were based on the end goal. Several iterations of the dress were made using a test fabric in white to allow for better visualization. The end goal was thought of again when a specific technique proved to be impossible to replicate. They concluded that "our main

concern was the quality of the information communicated to those who would view the dress" (de Paula, 2016).

The judgment of authenticity, of whether something is *authentic enough* is based on use. However, that is not the only way of judging a reproduction. In *A Framework for Assessing Military Dress Authenticity in Civil War Reenacting*, Strauss (2001) developed a continuum for understanding the level of authenticity of reenactors after an extensive qualitative study of civil war reenactors. Strauss was concerned with the entire perception of authenticity. This included the attitudes and knowledge of the participants. However, the author focused on how dress is the primary way in which authenticity is, or is not, established.

The authenticity continuum developed by Strauss is based on a few main principles. The first is that there is no such thing as absolute authenticity. As new research is done, new knowledge is created. This pushes the boundaries of absolute authenticity further away, meaning that a perfect reproduction is never possible. Additionally, there are many barriers to be overcome to reach a state of near perfect authenticity. Some of these barriers are of a practical nature. For example, not being able to afford or source authentic materials. Others include having a "cavalier attitude" or not having a deep knowledge of history. Every reenactor is affected by these barriers in a different way. The barriers to authenticity subtracted from the possible authenticity result in the actual impression of authenticity. This model has been found to be useful in

identifying the specific reasons why some reenactors are less successful than others in creating a "perfect impression" of authenticity (Strauss, 2001).

During my coursework, I developed a modified version of the authenticity model to use when judging my own reproduction work (Figure 1). Like Strauss' model (2001), it operates under the assumption that absolute authenticity does not exist. Our knowledge base keeps expanding at such a rate that no one person can possibly know it all. So, a position on the authenticity continuum is, by its very nature, an estimate. For a researcher, this means two things. The first is that no reproduction will ever be completely authentic. The second is that there will be some ambiguity when attempting to judge when a reproduction is authentic enough.

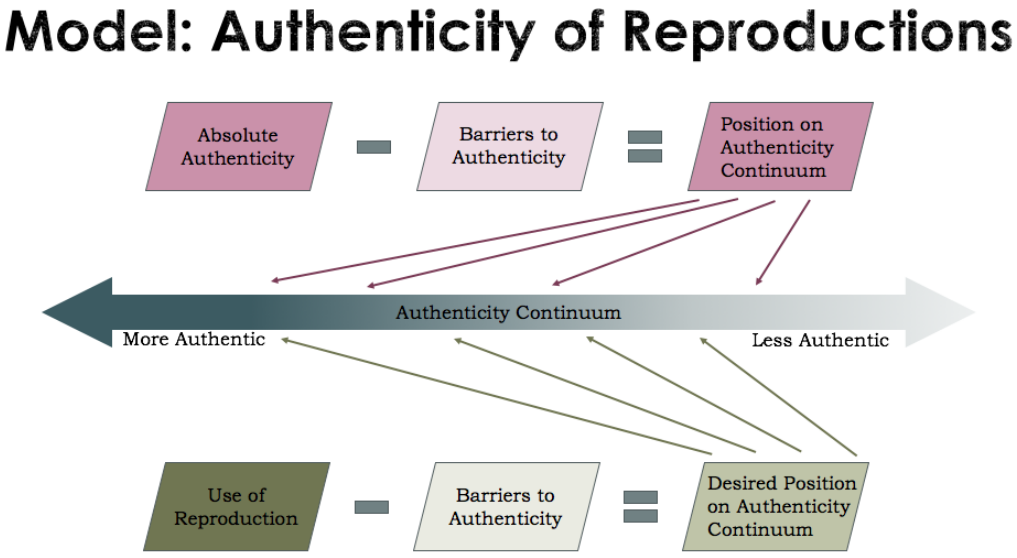

Figure 1: Authenticity of Reproductions Model

While authenticity cannot be precisely measured, it is useful to identify some criteria by which to make some judgments. There are many different elements to authenticity, but they can be divided into two categories: technical elements and perception. Perception of authenticity is subjective. Like with living history, this is something that is clear when seen. While originally tempted to dismiss this concept, the Rutherford-Morrison (2015) paper on living history museums has convinced me that this is a valuable element.

The concept of technical elements is significantly more straightforward. A reproduction garment is technically authentic if it uses only tools, supplies, and techniques that would have been available in the time and place of the object's original creation. A straight copy of an extant garment, like that done for Projecto Replicar (de Paula, 2016), has the strongest claim to authenticity. Anytime stylistic decisions are made by the maker of the reproduction, authenticity becomes more questionable.

Position on the authenticity continuum is determined by the equation at the top of the model. This is "absolute authenticity" minus any "barriers to authenticity." Barriers to authenticity include the following:

- Unavailability of materials
- Unavailability to tools
- Cost barriers
- Limitations of work hours/time

- Difficulty or impossibility of understanding techniques
- Difficulty or impossibility of examining materials
- Absence or unavailability of extant materials for study
- Ignorance of reproduction producer
- Romanticization of history or historic garments.

This list is based on Strauss' (2001) and covers both practical and psychological barriers. It is most likely not complete; however, the major barriers are present. These barriers, as they affect a specific project, determine that project's position on the authenticity continuum.

The third component of this theory is the most important. This is where one determines their *desired* position on the authenticity continuum. This is the most important part of the model because determinations of success or failure require a goal that can be met or not met. The desired position on the authenticity continuum is determined by the intended use of the reproduction. If the reproduction is to be used for long term display, like that of Projecto Replicar, then it is not necessary for the inner part of the garment to be made from period appropriate materials. So, their decision to use strong, long-lasting materials on the interior is justified (de Paula, 2016). One meant for wear in a living history museum, such as Colonial Williamsburg, would have different goals and a different desired place on the continuum. For example, a replica meant to be worn regularly by an interpreter might prioritize fabric that could be easily washed or

adapt the silhouette to be more comfortable on a modern body. For every project, the barriers to authenticity would have to be held against the proposed use to determine the desired place on the authenticity continuum. Additionally, by separating the barriers from the intended use, it is easier to judge the success of a project. In many cases, absolute authenticity would not be an appropriate goal at all.

Original Practice

A good example of reproduction work that does not require absolute authenticity can be found within the Original Practice movement. This method of reproduction is based primarily in the performance of early modern theater, particularly productions of Shakespeare's plays. Authentic dress may or may not be included in any given original practice production, depending on the goals of the project, however it is an important element in some. In one earlier critique of this method by Lopez (2008), the author was highly skeptical of the value of the Original Practice movement and how it interacts with both authenticity and historical theory. The author took issue with some of the movement's claims of authority and general lack of codified or cohesive methods. Part of this skepticism stemmed from the lack of scholarly writing, as most of the written material was only found on the websites of theatrical companies. This was found to be problematic for two reasons. First, there is no clear boundary between marketing copy and pedagogy. Second, the available writing is primarily focused on the effects the

reproductions have on the audience, rather than any standards or methods relating to the making of those reproductions. According to Lopez, "original practice, it turns out, is not really about nailing down the specificity of actual historical practice, but simply the quest itself for this kind of information" (p. 307). This allows for the academic community to see some of their historical research in an embodied form in the presence of a receptive audience. This creative engagement with history is at odds with the cold or distant approach advocated by the author.

Ten years later, Purcell (2017) sought to compare what they considered to be two separate movements: Practice-as-Research and Original Practice. The author defined Practice as Research as a discipline that originated and has lived in the academic world, primarily in theatre studies departments. The key issue grappled with within these departments revolved around how to differentiate scholarly practice from other forms of practice. Scholars argued that embodied knowledge gained by a practitioner was not considered scholarly unless it was externalized, analyzed, and commented on in language that could be understood by other scholars. At the same time, all outcomes of practice were seen as provisional and research was by its very nature iterative, with each discovery leading to new questions. In contrast, Original Practice developed from professional theater, largely Shakespeare's Globe and American Shakespeare Center in Staunton, Virginia. Practitioners of Original Practices were often criticized by the Practice as Research community for lacking clear research questions and making

overblown claims of authenticity. However, the Original Practices community saw the situation differently. Many adopted the term Original Practices to avoid using the word "authentic" and to free themselves from the constraints of having to recreate the past faithfully. Theatrical productions often used historical techniques selectively and combined them freely with modern practices. The use of historical techniques was informed by historical research and may have served to test some assumptions or discoveries made by the academy, but it was not intended to be historical research itself. Rather, Original Practices tested how these historical techniques worked in a modern setting. They also served to generate "excess knowledge," or information that was used to generate new avenues of inquiry.

One of the scholars Purcell cited in the above paper was Melissa Trimingham, who proposed a "spiral" method for Practice as Research projects (2002). The author was troubled by what she saw as a lack of clarity by others in the Practice as Research community. She wanted to create a method that transferred knowledge gained by practitioners into something that could be communicated to others but at the same time allowed for the disorderly nature of the creative process. This method was developed from those used in anthropology, social science analysis of qualitative data, and the Action Research method used in education and business research. The spiral method, which originated within Action Research, visualized knowledge as a spiral, and researchers necessarily entered at an arbitrary point, informed by their previous

knowledge. The goal of such research was to keep asking new, better questions before reaching an equally arbitrary pausing or exit point. This meant that researchers needed to acknowledge any hypotheses they formed before their work, so that they could evaluate the quality and openness of the questions that they were asking. This was important because the researcher was so intimately involved in the research when conducting Practice as Research. The spiral method looked to impose a structure on the cycle of action and reflection and allowed for it to become an externalized form of knowledge.

Pye (2019) focused on the addition of an audience into the process of Original Practice, particularly regarding the commodification of authenticity by theatrical companies. Shakespeare's Globe company was highlighted as a venture that sells authenticity while paradoxically balancing both authentic and inauthentic elements. In one example, an all-male production of *Twelfth Night*, the all-male cast was said to gain tacit knowledge through the act of wearing reconstructed garments while performing in front of said audience. The audience was included in this process through both the performance and a pre-performance ritual of on-stage dressing by the actors. The result for the audience, according to the author, was one of education through entertainment, rather than participation in research. This resulting experience was therefore more comparable to that of a museum exhibition. According to the author, both museum exhibits and theater "aim to activate transformation: to provide the museum visitor with the stimulus that provokes a newer, deeper understanding of, and appreciation for, the

displayed content" (p. 94). So, while there is value in Original Practice performance, it is less research and more a commercialized product of research.

Design Studies

In this study, the methods used were rooted in the work of fashion historians, but also taken from the emerging field of design studies. In *Designerly Ways of Knowing* (2006) Nigel Cross cited a 1979 study by the Royal College of Arts when trying to differentiate the study of design from the study of science. He said, "the authors imply that there are designerly ways of knowing, distinct from the more usually-recognized scientific and scholarly ways of knowing" (p. 7). Designers have used synthesis, as opposed to analysis to solve problems.

Cross also touched on the concept that knowledge is contained within designed objects. He implored designers not only to look at, but also to copy objects to learn from the past. At the same time, Cross drew a distinction between research and practice, saying "The whole point of doing research is to extract reliable knowledge from either the natural or artificial world, and to make that knowledge available to others in re-usable form" (p. 102).

Visualizing Research by Gray and Malins (2004) also pointed out the usefulness in doing as part of the learning process, saying "we learn most effectively by doing - by active experience, and reflection on that experience" (p.1). This book, written as a guide

for postgraduate research in the arts and design, provides ideas for generating a practice-based research project that is both rigorous and respectable. This includes the use of a research journal as a way of recording the process. The authors gave the advantages of a research journal as being "a comprehensive store of practice-based thought and action, with evidence and example" (p. 114), while the disadvantages are the idiosyncratic and personal nature of the information gathered.

Bye (2010) also offered a framework for conducting design-based research, specific to the field of clothing and textile design. The framework proposed three pathways along a continuum, through which works of practice as scholarship can be done and evaluated. Of these, the pathway of "problem-based design research" is most relevant to this study. This pathway calls for a well-defined problem that arises from an identifiable need. A standard literature review follows and a well thought out research methodology is used with the result generally being an artifact of some sort. There is an assumption that this process will be iterative, with new information extracted with every new attempt.

Like with experimental archeology above, a design studies approach provides some of the framework for this study but is not completely compatible. This is because, embedded within design, research is the idea that you are creating something new, solving a new problem, rather than extracting the reasoning behind something that already exists.

Tacit Knowledge

Adloff, Gerund, and Kaldewey (2015) began the introduction to the book on tacit knowledge they edited by admitting that "it is not easy to give a precise definition of tacit knowledge" (p. 7). After all, because the goal was to make the silent and inexpressible into the audible and explicit, there was an inherent tension in the study of tacit knowledge. According to the authors, the study of tacit knowledge was, historically, the domain of philosophers and epistemological studies. These focused on defining tacit knowledge as it relates to other forms of knowledge. In recent years, however, the authors noticed the focus of tacit knowledge research expanding. In my research, I found relevant studies that have one of two focuses: the capture of tacit knowledge related to complex human tasks and the spread and loss of tacit knowledge within an industry. Elements of each of these were relevant to this study, though none line up perfectly with the proposed study. The papers below were meant to highlight a handful of methodologies and theoretical frameworks.

Caird-Daley, Fletcher, and Baker (2013) developed a methodology from a human factors perspective with the aim of capturing the tacit knowledge used in manual tasks. The authors worked from a skills focused definition of tacit knowledge and described it as "the sort of information that people use readily but find difficult to express because it is not consciously recalled, it is applied instinctively and often resembles intuition" (p.

50). This knowledge was taught through experiences, such as observing a task being done, imitating another worker, and practice. The authors started with HTA or Hierarchical Task Analysis, which has been a popular method for breaking down and analyzing manual tasks. They extended it using a process called Task Decomposition, which broke down each part of the HTA further, with the researcher's specific goals in mind. This method was tested using experienced and apprentice welders. The authors found the results promising to break down tasks for automation. However, in a subsequent paper using the same methodology (Johnson et al., 2019) the authors concluded that this process was not efficient enough for application in industrial settings. That did not, however, mean that this was not a useful procedure for historical research.

One paper of interest that looked at the transfer and loss of tacit knowledge centered on the Finnish jewelry industry after the closure of the House of Faberge (Forsman & Solitander, 2004). This closure of the Russian house led to the repatriation of a significant number of Finnish jewelers. It was expected that the specialized knowledge of these craftspeople would have been passed on to the next generation. However, this did not happen and many of the innovative techniques used in the Faberge workshop were considered lost. This paper demonstrated how quickly such knowledge can be lost and highlighted the need to capture it. The authors of this paper drew on several different theoretical frameworks when defining tacit knowledge. Key to their viewpoint was the idea that tacit knowledge was not distinct from explicit knowledge, but

rather different dimensions of the same knowledge. The specialized knowledge that was passed on was sometimes transferred via a process called "stolen knowledge," which could have been gained by observing more experienced craftspeople working.

Recent Literature

Recently, there has been an increasing interest in using the process of reproduction and the resulting garments as a form of research. One interesting project that exists at the intersection of conservation and curatorial research focused on a 17th century blackwork jacket and underbodice (Hodson & Davidson, 2007). By coincidence, two researchers were working on the corresponding replicas simultaneously. The conservationist was using an extant garment as the starting point, with the end goal being the creation of a supporting garment for display and storage. The curatorial researcher was creating the underbodice based primarily on textual sources. A key difference in the creation of the two garments was that the use of historic sewing methods was not necessary for the conservator to accomplish the goal, but they were of strong importance for the curatorial researcher. However, bringing the two garments together allowed the researchers to gain insights into the functional aspects of the garments. This included the discovery that, when worn together, the two pieces fit well on a variety of body shapes. Alone, without the underbodice, the jacket fit poorly on many of the same people. From

this study, it has been suggested that there can be many different applications for reproductions once made and as many different approaches taken in the making.

Increasing access through display is one of the reasons for the creation of the garments. The projects seem to grow out of a need related to a specific garment that necessitates the making of a reproduction, as opposed to being driven by a specific research question. This means that the garments chosen are associated with well-known individuals and the makers are secondary or not mentioned at all. One of the best examples of this type of research is Hillary Davidson's (2015) reproduction of a pelisse believed to have been worn by Jane Austen.

The garment was frequently requested for exhibition and a reproduction was wanted to reduce the strain on the original piece. The garment in question had a less than certain provenance, and the process of creating the reproduction provided additional information supporting the claims that it had been worn by Austen. An important point was made in this paper regarding acceptable compromises in authenticity. At the time it was written, the researcher was unable to obtain an exact match for the fabric used and chose to substitute a similar print for the original woven design. The compromise was justified because, without changing the fabric, the project would not have been possible, and the resulting replica would still be able to fulfill all the functions required of it.

Another recently published paper highlighted the multiple angles that can be explored through a single reproduction project. This paper documented a project to

reproduce a waistcoat worn by Captain James Cook and made by his wife Elizabeth (Larkin, 2017). The article used the study of the object and the making of the reproduction to learn more about both the user and the maker. The main objectives of the paper were to learn more about the embroidery techniques used and "about James Cook as a person." Secondary goals of this project included the creation of a replica that could be used as a teaching tool and to see what the waistcoat might have looked like when new. Here again, the research started with a garment that has an attachment to a famous person and the goals of the project expand out from there.

Conclusion

This chapter explored a range of literature related to different fields, methodologies, and concepts on which the new methodology developed for this project was based. This included Experimental Archeology, Authenticity, Original Practice, Design Studies, Tacit Knowledge, and Object Based Fashion Research. The goal of this was to provide the background necessary to support the concept of reproduction as a form of research with the potential to unlock the tacit knowledge embedded within historic garments. This was followed by a review of several recent studies. These examples demonstrated the use of reproductions in a scholarly setting and at the same time showed an opportunity to take that research in a new direction.

Chapter 3: Literature Review - Seamstresses and the Garment Industry

This chapter covers the second area of literature relevant to this project: the history of the garment industry. The majority of this research covers the late 19th and early 20th century, however, it begins with a look at the garment industry before the industrial revolution to provide a larger context for understanding how that system evolved. Next, the general landscape of the garment industry in the late 19th and early 20th century is explored. Finally, three relevant areas are explored: training and apprenticeships, the impact of technology, and labor and activism.

The Garment Industry Before the Industrial Revolution

In addition to the research done on the physical objects, there has been significant research on the garment systems within which clothing has been made. Before the industrial revolution clothing was generally custom made. Levitt (1991) traced the early history of mass-produced clothing. The focus of this paper was on menswear, which was understandable because tailors, who made men's garments, embraced industrialization and ready-to-wear clothing first. Women, however, were hired to do the time-intensive manual labor of stitching the garments together from the start. According to the author "ready-made clothing has certainly been made since the seventeenth century, and it is likely that its mainly female producers were always poorly paid" (p. 182). After the invention of the sewing machine in the mid-nineteenth century production moved out of

homes and into factories. This new, highly productive system was praised at the time, but in reality, it did little to improve the lives of those sewing the clothing.

Structure of the Garment Industry During the Late 19th and Early 20th Centuries

Amneus (2010) described the system of dress production in North America during the later nineteenth and early twentieth centuries as consisting of three different factions: Tailors, Dressmakers, and Seamstresses. Seamstresses were used by both tailors and dressmakers to produce clothing. While tailors and menswear were quickly moving towards a primarily ready-to-wear business model, women's clothing was still focused on custom-made. The relatively fast pace of fashion change and complexity of styles made women's clothing less suitable for mass production. Both dressmakers and seamstresses were nearly always women, often those who were widows or unmarried. These professions were among the few acceptable professions for women, but they were not viewed equally. Seamstresses earned little money and had little prestige. Successful dressmakers were business owners who enjoyed a comfortable living. Many knew what was fashionable and were highly knowledgeable regarding the cut of garments. As styles simplified in the early twentieth century, dressmakers' businesses were overtaken by department stores and specialty retailers. By the 1920s the custom dressmaking industry was essentially gone.

Other papers have traced the dressmaking industries in specific cities, with similar findings. The city of Toronto was the focus of one such study, which covered the years of 1834 to 1861 (McKnight, 2018). The author traced the movements of workers in the "needle-trades" to highlight the importance of the industry in the time before industrialization. Dressmakers were able to afford to run their own businesses, including the hiring of others. Seamstresses were defined as those who performed work for others. A seamstress might also work for tailors or dressmakers. In either case they were low paid and often faced seasonal unemployment. The labels of seamstress and dressmaker were not necessarily indicative of skill but were more related to social and economic class. Training was acquired through apprenticeships, but there was no standard length or curriculum. As the city industrialized in the later part of the nineteenth century and the division between dressmakers and seamstresses grew wider, the mass production methods of factory work led to extremely harsh conditions for those in the so-called low skilled profession.

Another paper looked at the appearance of labels in women's garments in Barcelona near the end the nineteenth century (Casal-Valls, 2016). This paper found three similar main groups working in the women's side of clothing production: "dressmakers with their own workshop; hired dressmakers or modistillas; and obreras de la aguja or needleworkers" (p. 228). The author considered this to be a transitional time in the garment industry in Barcelona, and the introduction of clothing labels was one of

the indications of this change. Part of this change involved a shift among dressmakers from craftspeople to designers, further separating them from the needleworkers. Another interesting development during this time was the establishment of a formalized method of training.

Most relevant to this study was McShannock's (2000) paper on the dressmaking industry in the Twin Cities which focused on the mid and late-nineteenth century. At the beginning of that time frame, women's dress was predominantly still custom made. There were many professional seamstresses, but most women were capable of reworking an old garment. Clothing was expensive, so while Minneapolis was a well-off area, women still altered and remodeled garments regularly. This led to the employment of a significant number of seamstresses, around 5,000 in the Minneapolis-Saint Paul area alone. They worked 10 hours a day, 6 days a week or more during the peak seasons but, like their counterparts in Toronto, suffered from seasonal unemployment. By studying archival documents, including the records of several prominent dressmakers, the author was able to establish that some of the work done by seamstresses was on a piecework system. Women were specified as a "skirt maker" rather than a seamstress. This suggested that each garment was produced by several people. According to McShannock, seamstresses were seen as interchangeable, which manifested as unfair treatment of workers including long hours and pay that was not always timely or complete. The general attitude was that seamstresses who objected to the way they were

treated should quit and find new employment somewhere with better working conditions. The local dressmaking industry began to decline at the start of the twentieth century as women's styles were simplified and more women purchased ready-to-wear clothing.

Training and Apprenticeship

Training for the needle trades in the late 19th and early 20th century was unstandardized and often challenging, as described in *Gifts to be cultivated: Dissertation on training in the dressmaking and millinery trades from 1860-1920* (Mack, 2011). While all women had their own unique path into the trade, the author identified six main avenues of training: self-study, apprenticeships, public school, private schools, college, and community education. Self-study included home sewing, magazines, books, and correspondence schools. Girls were taught to hand sew as soon as they were old enough to hold a needle and would learn to use a sewing machine around the age of 10. Sewing information found in magazines and books frequently blurred the lines between trade and home sewing, promoting the myth that most women could become dressmakers if they so choose. These publications were consistently targeted at white, middle-class women who had been born in the U.S. Women of color, immigrant women, single women (with or without families), and those advocating for social change were ignored.

Apprenticeships were intended to teach both the sewing skills necessary for working as a seamstress and the business side of running a dressmaking shop. These were

arranged with a shop owner and could require tuition and unpaid labor, or the apprentice could be paid a small weekly wage. Apprenticeships typically lasted from six weeks to a year. The quality of an apprenticeship was highly dependent on the shop owner. Many were reluctant to teach students how to pattern and cut to avoid competition. The increased division of labor found in larger shops meant that apprentices were increasingly less likely to learn how to make a dress from start to finish. As apprenticeship quality decreased and other work opportunities increased, fewer young women were willing to work long hours primarily as errand girls for little or no pay. However, errand girl apprenticeships were often undervalued as they taught the apprentices how the business worked, allowed them to learn shop norms, and had them interact with customers. They also served as a trial employment period, to see if a girl could learn quickly and while working hard enough to be useful. If selected to stay on after an apprenticeship, the woman would receive additional training over time as she moved up the shop hierarchy and was trusted with increasingly complex work (Mack, 2011).

To fill in the gaps left by self-study and apprenticeships, aspiring seamstresses and dressmakers increasingly turned to schools. Public schools taught sewing at a variety of levels including kindergarten, primary and grammar, trade school, high school, and evening school. Kindergarten and primary school focused primarily on home sewing. Many girls dropped out after completing grammar school, usually because the lure of money was more appealing than classwork. However, the jobs they were able to obtain

with that level of education were poorly paid and largely dead end. Trade schools were aimed at fixing this problem by preparing poor girls for work in dressmaking shops. These typically included an apprenticeship element in addition to classwork. The value of these trade schools, both to the student and society, was a never-resolved argument. Middle class girls, for whom work was not a necessity, were the primary customers of private sewing schools. Private schools ranged widely in size, and some of the smallest were run out the home of successful dressmakers. These institutions were criticized for treating students like customers instead of preparing them for the hard realities of a life in trade. Poor work was often overlooked by teachers because they relied heavily on student recommendations for new business. Evening school was largely for women who were already working and wished to advance in their careers. High school and college were almost exclusively for girls who wanted to become teachers. Most of the sewing taught was home sewing, as that was what they would be teaching to their students after graduation. Community education included clubs, conventions, fairs, local classes, and youth groups and could be either oriented toward home sewing or trade (Mack, 2011).

Impact of Technology

At the same time as the commercial clothing industry was growing and evolving, home sewing was also undergoing a transformation. Connolly (1999) used advertisements and other media to trace attitudes regarding the sewing machine, and thus

the act of sewing itself, from 1890 to 1925. Sewing was a constant chore for most nineteenth century women. While they may have purchased some of the garments for the men and boys in the family, women's garments were not readily available. Women had to provide clothing for themselves and their daughters. Additionally, household goods such as linens and pillows needed to be sewn. Even wealthy women, who could afford to go to a dressmaker or hire a seamstress, were not able to entirely escape this labor. It is understandable that when introduced in the 1850s, the sewing machine was viewed as a great saver of time and labor. Sewing machines were then prominently displayed in homes. With the rise of the ready-to-wear industry, sewing machines lost status. Home sewing clothing on the machine had been the alternative to sewing clothing by hand; now it was the alternative to ready-made clothing. Owning a sewing machine thus became a way of saving money, as opposed to saving time/reducing work. As homemade clothing became stigmatized, so did sewing machines, which were hidden away.

Sewing machines, however, were not the only technological innovation to have an impact. The emergence of pattern drafting systems, followed by the graded commercial patterns also affected both home sewing and the professional dressmaking industry. Gamber (1995) identified cutting - the ability to design and create a pattern for a garment - as the skill that separated dressmakers from all other types of needlewomen. Those with this skill were at the top of the shop hierarchy, often the owners. Below them were finishers, experienced seamstresses who would assemble the dresses. This required

significant knowledge of garment construction, as an inappropriate stitch choice could ruin the lines of a dress. At the bottom of the shop hierarchy were apprentices who ran errands and performed simple sewing tasks. The apprenticeship system had been the traditional route into the profession, however, it had been increasingly dysfunctional as many shop owners avoided teaching cutting skills to their apprentices in an effort to avoid creating new competition for themselves. The invention of drafting systems threatened this hierarchy because it removed the shop owner's monopoly on cutting knowledge. The systems often claimed to replace knowledge of pattern making, however, most of the resulting patterns required significant alterations. Additionally, many of these drafting systems were designed by men who had little knowledge of dressmaking. Some drafting systems were nothing more than scams, which could be tragic for women who purchased them after finding themselves unexpectedly in the position of needing to support their families.

Over time, however, these drafting systems improved. They were adopted by professionals as well as home seamstresses. The systems were especially popular in remote areas where professional training was hard to come by. Drafting systems allowed professional dressmakers to increase the speed of production. Combined with the widespread adoption of the sewing machine, these changes encouraged specialization among seamstresses, leading to dressmaking shops that functioned increasingly like

factories. Out of these drafting systems also evolved graded sewing patterns, further paving the way for ready-to-wear clothing.

Labor and Activism

While poor working conditions were endemic to the garment industry, the women who made up this labor force were not meekly resigned to a life of hard labor. *Common Sense and a Little Fire* (Orleck, 2018) highlights the lives and work of three early 20th century labor activists, Pauline Newman, Clara Lemlich, and Rose Schneiderman. These women, who were barely old enough to be considered adults when they started working in the New York City garment industry, became interested in socialism and unions not because of any philosophical reasons, but because of their oppressive working conditions. Said Newman: "We of the 1909 vintage knew nothing about the economics of…industry or for that matter about economics in general. All we knew was the bitter fact that, after working seventy and eighty hours in a seven-day week, we did not earn enough to keep body and soul together" (p. 33-34). The women in this book dedicated significant portions of their lives to organizing garment workers, both in New York City and throughout the United States.

Organizing garment workers was a large and complex task. The facets of the industry that relied on sweatshop labor were particularly difficult to coordinate. Production took place in scattered locations and the work had been broken down into the

simplest possible tasks, so was said to require very little skill. Additionally, the workers were often immigrants with a wide range of different cultures and languages, making even basic communication between workers challenging. The factory owners exploited this by sowing divisions between groups. For example, it was not uncommon for the manufacturers to stop unionization attempts by telling the Italian women that the Jewish women would not stand beside them in a strike. The women solved this problem in part by working to recruit organizers within the different ethnic groups. Gender was another issue that frequently got in the way of the female organizer's efforts. Male union leaders were unwelcoming to women who attempted to take leadership roles. Male workers were afraid that any improvement in the lives of women workers would come at their expense. They resisted attempts to give women access to higher paid positions like cutting. Additionally, while the organizers found allies in the upper and middle class, navigating these relationships was often complicated by a lack of understanding of the workers true needs and respect for their agency (Orleck, 2018).

The Minneapolis area, while similar in many ways to the rest of the United States, had its own relationship to labor and unionization. The book *Community of Suffering and Struggle* (Faue, 1991) looked specifically at labor relations in the Minneapolis area from 1915 to 1925. While there were many attempts to organize labor throughout that time, efforts were not as widespread or as successful as in the Northeast. In the garment industry, a few key points may have been responsible for this difference. First, dress

factories were slower to arrive in the Twin Cities than in cities further east. It was not until the 1920s that ready-to-wear dresses were produced in significant quantities in the region. Additionally, the better paid jobs of cutter and presser were largely held by women in the Minneapolis area. This meant that there was an established path out of the subsistence level work for at least some. However, there were also some things that were very similar. Unions for different crafts fought among themselves, undermining the efforts of on-the-ground organizers. Gender divisions were still a hindrance to those seeking unionization and "when women workers did organize, they organized as they had historically-without the support and sometimes in the face of hostility from male unionists" (p. 54).

In a book on the Munsingwear undergarment manufacturer, The Northwestern Knitting Company, the author pointed out several more differences between the Minneapolis garment workers and those on the east coast. Government regulation, not unionization, had been the focus of local labor activists. These efforts resulted in stricter regulation than could be found in other parts of the United States. Complicated rules for hiring minors meant that child labor was particularly rare in Minneapolis, with most of the underage workers found in small shops or training programs. Additionally, the women in the Minneapolis area were described by one investigative reporter as being less accustomed to oppression than factory workers on the east coast, saying "most women at the Northwester Knitting Company were 'cheerful and intelligent' and 'evidently' they

'hadn't been under factory discipline long enough to render them otherwise.' Thus, they were not fully subordinated to the discipline that constituted a part of industrial capitalism" (p. 53). In response to these attitudes, factory owners subjected their workers to draconian rules forbidding them to talk or look out the window during their shifts. The First World War increased employment of women but did not necessarily improve the quality of the available jobs. The level of mistreatment varied, but some women factory workers were "exploited in a way that went beyond what was acceptable for public opinion" (p. 3). At companies that manufactured goods for use in the war effort, such as the Munsingwear undergarments, striking and other forms of organization were painted as unpatriotic by the factory owners (Olsson, 2018). Overall, the women working in the garment industry in the Minneapolis region in the 1910s and 1920s appeared to have been treated slightly better than in cities further east, but their working conditions were still very harsh, and efforts to better them were met with strong resistance.

Conclusion

In this chapter, the role of the seamstress and the sewing machine in western garment manufacturing during the late nineteenth and early twentieth centuries was explored. This section was meant to establish the seamstress as an underappreciated figure in the garment industry. One who, despite possessing a much-wanted skill, had been treated poorly by the fashion industry since its inception.

The following chapter proposes a method for extracting the tacit knowledge from historic garments as well as a case study to test it. This is done in the hopes of drawing attention to the work of seamstresses, uncovering the skills and level of expertise needed to create these garments.

Chapter 4: Methods

The purpose of this study is to identify possible changes to the sewing skills and tacit knowledge needed to construct garments made in the 1910s and the 1920s. To that end, I developed a method intended to explore a new way of extracting tacit knowledge and sewing skills from historic garments. First, the methods that most directly influenced this project are introduced. Second, the research question is presented. Third, the sample is discussed. Fourth, the six phases of the study are introduced. Last, the anticipated limitations of the study are introduced and acknowledged.

Introduction

Many different possible approaches were considered when planning this process. Material culture methods were the first to be investigated. Prown (1982), Zimmerman (1981), and Fleming (1974) all created formalized methods for analyzing objects that could be applied to this project. However, it was important that any method used have four characteristics: suitability for clothing, ability to be used to compare two objects, a technical focus, and the ability to triangulate the findings. The first of these requirements is self-explanatory as this study was developed specifically to answer a research question related to garment sewing. Second, the focus on change over time meant that the method needed to be structured in a way that allowed for a comparative study to be done. Third, as the project was focused on garment construction, the method needed to allow for an

extended focus on the technical aspects of the objects. Fourth, the method needed to provide the opportunity to establish the validity and credibility of the findings.

The starting point for the development of the method for this project was one developed by Severa and Horswill (1989). The authors created a material culture analysis method that draws on Zimmerman and Flemming, adapting it to be used with dress objects and in a way that allowed for the comparison of multiple objects. This consisted of three parts:

- Determining the modal type of the sample
- Analyzing three properties of the artifact: material, design/construction, and workmanship
- Examining each of the above properties with identification, evaluation, cultural analysis, and interpretation/intuitive analysis

These three steps provided the starting point for developing the method used in this project but were far from the only influence. The method developed by Severa and Horswill (1989) did not include the creation of a reproduction, so additional methods were used to fill this gap. The steps used to make the reproductions were influenced by methods based on those found in experimental archeology, design studies, and textile conservation, as well as a small number of relevant studies by costume historians/curators. Most significantly, the Task Decomposition categorization as developed by Caird-Daley, Fletcher, and Baker (2013) was modified. Additional

documentation tools were developed on an as needed basis, with influence from modern garment manufacturing documentation tools such as spec sheets and worksheets for material culture analysis developed by Mida and Kim (2015).

The final research method used consisted of six stages, which were applied to two similar garments made approximately ten years apart. Dress A (c. 1915) and Dress B (1924), from the Goldstein Museum of Design were chosen to serve as a case study for this project. Each stage was completed for both garments before moving on to the next stage. In each stage, the 1920s garment was worked on first, followed by the earlier 1910s garment. The purpose of this was to run through each stage on the simpler garment first. This allowed for corrections or adjustment to the method before moving on to the more complicated, older garment. The stages consisted of:

1. *Documenting* the construction and materials used in the two primary garments and ten secondary garments used in this study.
2. *Establishing the "typicalness"* of the primary garments by comparing them in style and construction to the ten secondary garments.
3. *Experimenting* with techniques and materials to test assumptions and theories related to the making of the garments.
4. *Analyzing the results of the experiments and corresponding notes* to find patterns and highlight insights.

5. *Creating reproductions* of the primary garments while taking notes using a modified version of the Task Decomposition framework.
6. *Analyzing the Task Decomposition Worksheet* to find patterns and insights.

Together, these six steps combined multiple methods to provide a deeper understanding of the differences and similarities between the two garments. Most important to this was the inclusion of three different points of data collection (1, 3, and 5) and data analysis (2, 4, and 6). This three-pronged approach provided a variation on triangulation of the data, which was one of the techniques used to ensure the validity of a study (Bye, 2010). However, the result was more of an excavation than a triangulation, with each level providing a deeper and more precise understanding of the information gathered. Additionally, each of these levels was dependent on the one above. Experimentation cannot be done without first careful and thorough observation. Recreation was not possible without the work done during the experimentation phase. The dependent nature of this method allowed the technical differences between the garments to be thoroughly documented in a way that builds upon itself. This Excavation Model is illustrated by Figure 2. This hybrid method was intended to provide the information to answer the research question:

Research Question

- Were there measurable changes to the tacit knowledge and sewing skills required by seamstresses during the period when the custom-made clothing industry rapidly declined, and the ready-to-wear industry accelerated?

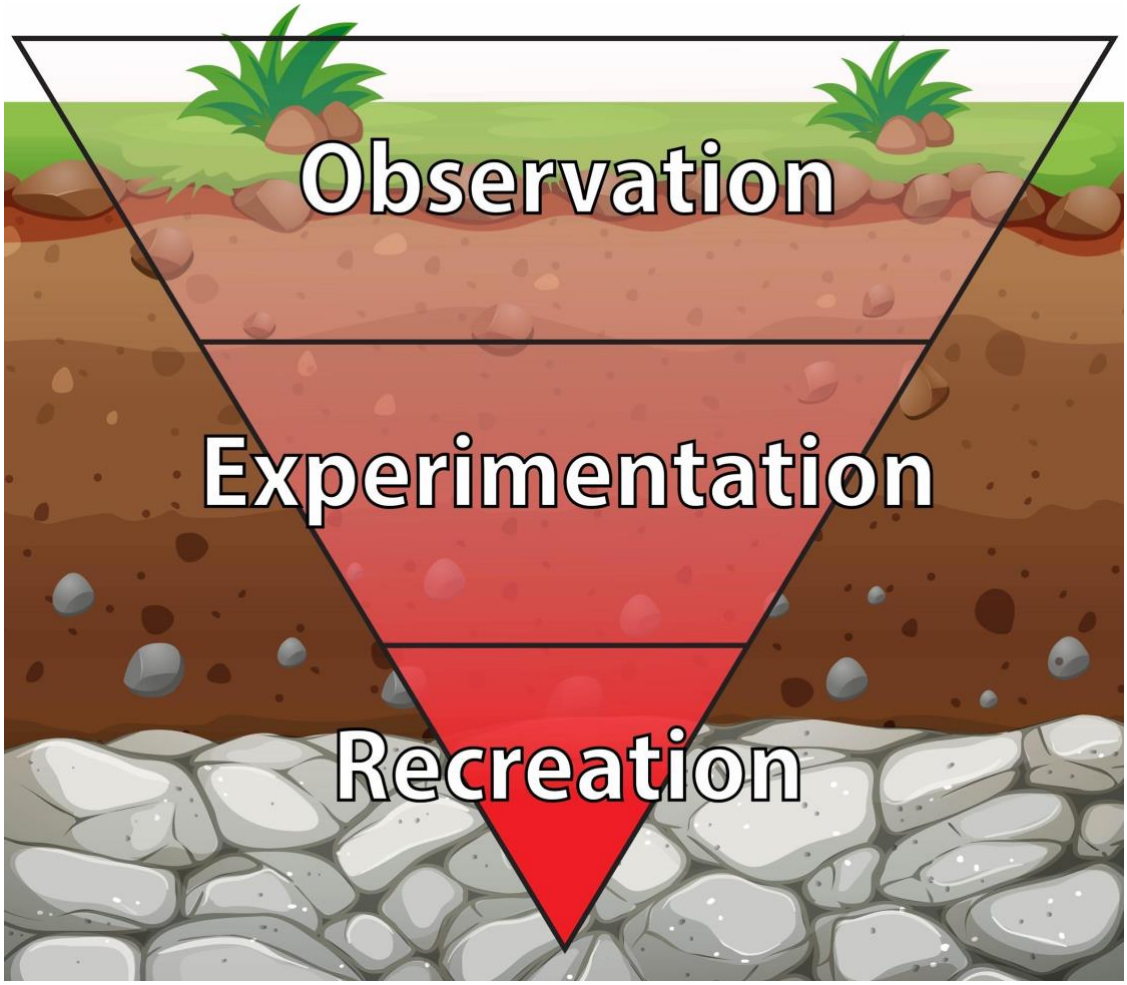

Figure 2: Excavation Model

Research Sample

The sample for this study consisted of twelve dresses from the Goldstein Museum of Design (GMD) at the University of Minnesota. Two of these dresses, Dress A and Dress B, served as the focus of this study. The additional dresses were used to establish the date and "typicalness" of the two primary examples, to situate them in time.

Several factors went into deciding on the two primary samples. First, based on my previous experience with historic garments, both garments appeared to be representative of their respective periods. This was based on a preliminary study of their style and construction conducted when they were chosen for use in the 2007 GMD exhibit *Inside Her Clothes*. Second, having studied both garments before, it was clear that both garments were in good enough condition to allow for the repeated handling necessary for study and the taking of patterns and measurements.

Third, the two garments are outwardly very similar in appearance, but inwardly very different. They are both made of lightweight, grey fabric. Both have similar design details, including long sleeves, a flat collar, and numerous self-fabric decorative buttons. This similarity of design functions to control for stylistic differences as much as possible. However, inner structure of the older dress includes a significant amount of structural work, most notably an inner bodice made of net. The 1920s dress has almost no inner structure. These differences in understructure illustrate the changes in construction and sewing methods that are the focus of this study.

Figure 3: Dress A, 1910-1918. Photo courtesy of the Goldstein Museum of Design, 1996.146.004.

Figure 4: Dress B, 1924. Photo courtesy of the Goldstein Museum of Design, 1992.004.002.

Fourth, the availability of the garments at GMD was an important consideration. As the museum has been part of the University of Minnesota's College of Design, it was possible to view the garments as many times as was necessary to gather the information needed for reproduction. The museum allowed for hands-on study of all the garments, meaning that the inner workings could be explored, and measurements could be taken for patterns. I was allowed to take as many photographs as needed, which was vital to both

the process of reproduction and establishing the garments in time. This included photographs of interior construction details that would otherwise have been extremely difficult to document. The museum was able to provide professional photographs on mannequins of the two primary garments and several of the secondary garments. This level of documentation would not have been possible in a museum that provided less generous access.

Fifth, availability of materials and feasibility of reproduction were considered when selecting these samples. In selecting materials, the primary consideration was that the material function like the original. Meaning that an exact match in color or pattern was not required, only that it needed to be close enough to sew and drape like the original. Based on sourcing for previous projects, I was aware of suppliers for more than half of the supplies I would need. While it was anticipated that some of the additional supplies would be more difficult to acquire than others, I was confident I could use the authenticity continuum discussed in the previous chapter to help me make decisions about the suitability of the available supplies.

The ten secondary dresses were chosen from the GMD collection. Five of them were from the 1910s and five from the 1920s, so that each of the primary dresses could be compared to the same number of secondary garments. These garments were chosen based on the strength of their provenance and their outward similarity to the two test cases. These similarities were both in style and in materials. Both evening and day looks

were considered. However, dresses that were known to be from very high-end European dressmakers were eliminated. This was because there was a chance that the construction would be different enough that it would skew the results. A full list of the chosen garments is available in Appendix A: Research Sample.

Phase 1: Documenting the Garments

In Severa and Horswill's (1989) method, determining the modal type is the first step. This consists of creating a list of the basic characteristics of the garments, allowing them to be studied and compared. According to the authors "the advantage of beginning in this manner was that it established both a vocabulary and a simplified division of elements which were then used throughout the study" (p. 54).

The second step involved taking a detailed look at the materials and construction methods used to create the artifact. This was broken up into three parts: cataloging the materials used, construction, and workmanship. Cataloging involved documenting the fabrics, findings, trims, and notions used on each dress. Construction consisted of examining how the garment was put together. This included noting the basic parts (bodice, sleeve, skirt) as well as how they were put together. The last, workmanship, looked at the quality of the construction. It was divided into two categories: treatments such as seam finishes and the level of skill demonstrated.

To keep this data organized I utilized a few tools. The first were two checklists created by Mida and Kim (2015) called: "Checklist for Observation" and "Checklist for Reflection" found at the back of their book *The Dress Detective.* These were modified both before and during the process to better reflect the information needed and to streamline the observation process. See Appendix B: Checklist for Observation and Reflection. Both primary garments and all ten of the secondary garments were documented using this process.

All the garments had photographs taken during the study process. The photos were not intended to be aesthetically pleasing, but rather were sources of information. These were taken so they could be referenced during the analysis phase both to clarify and supplement the written notes. A cellphone camera with the flash deactivated was used to take all the images. This was chosen because it was a piece of equipment that was readily available, however, the light weight and small size also turned out to be beneficial.

Additional documentation was required for the two primary garments. First, drawing on modern garment production practices, a pattern record card was completed for both garments (Appendix C). This included a list of all the pieces used to make the garment, the additional findings, trims, and notions, and a digitally created flat illustration. Then a spreadsheet was developed to document how the pieces were joined together. This spreadsheet captured the location of the seams on the garment, the pieces

that were joined together, seam allowance width, seam type, seam finish, and any additional notes.

Patterns were then taken using a combination of detailed measurements as described in *A Practical Guide to Costume Mounting* (Flecker, 2013). This method involved paying careful attention to grain lines and emphasized the need to avoid damaging the garments. While the measurements were originally intended to be supplemented by tracings, due to the slippery nature of the fabric, it was quickly determined that tracing was not suitable. The risk of damaging the dresses was too high.

Figure 5: Photo capturing the depth of the sleeve dart on Dress A

Next, using the pattern record card as a checklist, rough sketches were created of the shapes of each pattern piece. Measurements were taken of the original garment and these numbers were annotated on to the rough pattern shapes. See Figure 6. These measurements represented the key points needed to recreate each piece, such as the

length and width of each skirt panel and the position and spacing of the decorative buttons. These sketches were created digitally using Notability, a note taking application, and a stylus. Sketching digitally had the advantage of allowing for multiple colors to be used as needed, which is otherwise not possible when working with objects in museum collections. In addition to these sketches, several dozen photographs were taken of each dress. Where possible, a brightly colored measuring tape was used in the photo. These images proved invaluable throughout the process by providing additional context for the measurements taken and a detailed reference of the sewing techniques used later in the construction process.

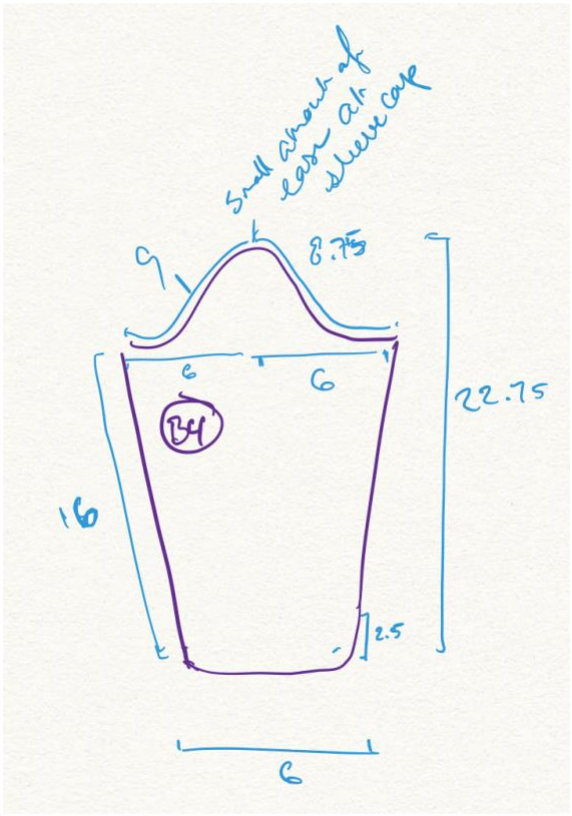

Figure 6: Notability sketch of measurements for Dress B sleeve.

Phase 2 Establishing the "typicalness" of the Garments

Next, the information collected on the two primary and ten secondary dresses was analyzed. The goal of this analysis was to find any patterns that could be used to identify

the dresses as having been made in one or the other decade. This phase was a continuation of the "determine the modal type" step in Severa and Horswill's (1989) method, in that the goal was to develop a common language or set of characteristics to use to discuss the dresses. After reviewing the notes taken during Phase 2, a spreadsheet was created to organize the data. These were divided into four categories based on those used by Saiki & Stephens (2014) in their analysis of the quality of 1920s dresses. In that study the authors adapted a framework used to teach the discernment of quality in modern garments to design and merchandising students. This adapted framework allowed for a systematic analysis of the quality of historic garments.

The items within these categories were simplified and some items were changed to keep the focus on elements relevant to this study. An additional category was created to hold administrative and other miscellaneous information. The result was five categories:

- *General* - Administrative information, alterations, and repairs, if the dress can be handled, and any label information.
- *Shape, Silhouette, and Style* - Shape of each section of each garment, the location of any decorative details, presence or absence of internal structure.
- *Fiber, Yarn, and Fabrication* - The number and types of textiles used.
- *Stitches, Seams, and Edge Finishes* - Stitch type and quality, the types of seams present, the method for finishing the edges.

- *Findings and Trims* - The presence of trims, the types of closures, frequency of closures.

The subcategories contained within were filled in based on the information gathered using the modified "Checklist for Description" and "Checklist for Observation." Some of the information was unambiguous. For example, there was little room for interpretation when deciding if a dress had a waist stay or not. Other subcategories required judgment calls. These usually involved determining the complexity or skill level involved in the construction of the dress. In these more subjective categories, the focus was to remain consistent across the study. This consistency was achieved by thinking in terms of comparative, rather than absolute, terms across the dresses. For example, the complexity of a dress was judged by several factors including the number of pieces, the number and complexity of closure, and the presence and difficulty of creating ornamentation. Each dress was evaluated individually, then compared to the previously judged dresses.

Phase 3: Experimentation

The Experimentation phase was the first half of the sewing process. Both this and the following phase were designed to capture the information collected by Severa and Horswill in the second step of their process, Design and Construction, at a deeper level than would be achievable with only observation. The purpose of this phase was to gather the necessary supplies and information needed to create the final reproductions. The

experimentation phase consisted of creating patterns, writing out the order of operation, sewing toiles, and sewing technique samples out of fashion fabric for both the primary dresses. Sewing the final garments would not be possible without the preparation accomplished in this phase.

Throughout this process, notes were taken to capture insights and other thoughts related to the experiments. These took many forms, depending on when and where they first occurred. While actively working on the project, notes were kept in a word document, organized by topic. Outside of formal work hours, the notes were recorded in whatever format was available, most often a personal bullet journal. These were transferred into the primary word document when work next resumed.

Tools and Workspace

This project was done in a dedicated home workspace using sewing tools readily available to the modern sewer. Cutting was done manually on a three-foot by five-foot portable cutting table. Tools included a pair of ten-inch Ginhger shears, embroidery scissors, needles of various sizes, and glass head pins. A modern electric steam iron and ironing pad were also used.

To best replicate the experience of sewing in the early part of the 20th century, it was desirable to have a simple machine, one without computer controls and automatic assistance. Electric powered sewing machines and irons had been patented as early as the

1890s (Emery, 2014), so there was no need to search out a treadle machine. A Jenomi HD 3000 electric sewing machine was chosen for this project. Choice was made in part because it was a machine the researcher already owned and was familiar with. This eliminated both the expense and time involved in acquiring a new machine. Additionally, this Jenomi model was a simple machine with a limited number of stitches, no onboard computer, and strong metal interior workings. It is as close to an early 20th century machine as was necessary for this project. Additionally, one of the goals of this project was for this knowledge to be applicable to modern sewers. A project involving a vintage machine would have a more limited application.

Patterns

Creating the reproductions began with the creation of patterns for each dress. Three methods were considered for making the patterns. Hand drafted hard copies on paper, digital patterns made using professional pattern making software, and digital patterns made using Adobe Illustrator. Professional software was rejected because it would have been too time consuming for the researcher to learn and the software was not readily available for individual purchase or use. Hand drafted patterns were not used because there would be no back-up in the event of an unforeseen disaster. So, the third option, a method that utilized Adobe Illustrator and was based on measurements from

each piece was chosen. This method ensured the safety of the data and provided the potential to share the patterns if desired later.

Toiles and Order of Operations

Once the pattern was created, the next step was to develop an order of operations. However, it quickly became clear that it was best to work on this while simultaneously sewing a sample garment or toile. Making toiles of Dresses A and B had originally been intended to check for any errors in the pattern, but the sewing process also served to test and refine the order of operations. Often, steps that appeared complicated were clarified through the sewing process. These two steps were completed concurrently.

Creating the order of operations began by observing the construction of the garments. This was done primarily using the photographs taken during Phase 2. Written notes and the seam worksheet were also heavily relied upon. Assembly was assumed to follow the modern industry sewing order as laid out by Amaden-Crawford (2015) unless proven otherwise.

While several options for fabric were considered, the decision was ultimately made to construct the toiles out of muslin. As the main priorities of this phase of the study were accuracy and the ability to experiment, it was decided that fabrics that mimicked the slippery, drapey and delicate fabrics used in the originals were not ideal. Additionally, the toiles were not intended to mimic the drape of the finished garments,

nor were they intended to serve as practice for managing any difficulties involved in sewing the final garments. Fabric that was stable, easy to work with, and inexpensive was needed for this phase of the project. These toiles differed from those used when designing clothing by including the seam finishes and hand sewing used in the originals. This was time consuming, but ultimately necessary because so much of the construction of Dress A was sewn by hand.

Figure 7: Dress A Toile.

Figure 8: Dress B Toile

Materials and Fashion-Fabric Technique Samples

While the toiles were being made, the materials for the final reproductions of the two primary dresses were sourced. Similarities in hand and weight were prioritized when

ordering the fabrics. Color and pattern were important, but ultimately secondary. Materials that were re-orderable were prioritized so that if additional materials were necessary, they could be easily obtained. Internet-based fabric companies that provided information on availability were preferred. Dharma Trading was used for several fabrics as they have a constant supply of silk charmeuse and silk chiffon dyed to matching colors. Generic notions such as snaps were bought from a local sewing store or purchased through the online sewing supply company wawak.com. A preliminary budget was developed, which included money spent on muslin for the toiles. The estimated cost of the project was $400.

Budget

Test fabric	$75
Self-fabric 1910s Dress	$150
Self-fabric 1920s Dress	$100
Contrast fabric 1910s Dress	$25
Structure fabrics	$20
Thread	$10
Notions	$20
Total	**$400**

Once the fabrics arrived, technique samples were created to test how the fashion fabrics behaved when sewn. These samples were small, roughly six-inches by 8-inches. This size allowed me to focus on how the fabric reacted without the time, complexity, or expense of sewing a full garment. This was especially important because some samples were repeated several times before being deemed satisfactory enough to move on. In both cases, a simple plain seam sample was created first to test how the fabric reacted to the machine and to determine what, if any, settings needed to be adjusted. Next, the notes taken during the toile making process were consulted. From these notes a list of samples to be created was developed. If the sample was only intended to test one element, such as attaching the lace trim to the net used in the underbodice of Dress A, then the sample was made without additional preliminary testing. If multiple elements were involved or if there was an element that had some room for variation, additional informal tests were done to work out unknowns. For example, when creating the loop sample for Dress B a few different lengths of self-covered cording were tested before deciding on the length each piece needed to be cut. An exact measurement could not be taken from the original due to the curvature of the loops. Lengths of 2", 2.5", and 3" were considered, with 2.5" eventually being chosen based on the samples created.

Figure 9: Selected Dress A Fashion-Fabric Technique Samples. Clockwise from top left - Contrast damask fabric to self-fabric, French seam on net, self-fabric and net mock-armhole, lace trim to net, hand hem on chiffon, plain seam on self-fabric.

Figure 10: Selected Dress B fashion-fabric samples. Clockwise from top left - Loops and buttons, corded piping on a corner, jetted-pocket, shoulder pintucks, plain seam.

Phase 4: Analyzing the Experimentation Products and Journal

In the final step of their methodology Severa and Horswill (1989) look at the data they gathered through four different lenses: Identification, evaluation, cultural analysis, and interpretation and intuitive analysis. In Phase 6 these lenses were used to evaluate the two primary dresses based on these four lenses. The notes were an important source of information here as they captured fleeting thoughts during the Experimentation Phase that might otherwise have been lost. The order of operations and physical samples also served as physical representations of the lessons learned and the information gathered during the Experimentation Phase. The identification lens was, as in the original, a detailed description of the physical properties of the two dresses. The remaining lenses differed from the original only in the focus. This analysis was only concerned with the maker of the garments and was not at all concerned with the person who wore the garment.

Phase 5: Creating the Reproductions

The next step in this process was sewing the reproduction garments. The reproduction garments were full, completed dresses made from fashion-fabric. They were different from the toiles because they used functionally authentic fabric. They also were different from the technique samples because they reproduced the entire dress, rather than a small section. However, before this could begin, a few additional steps were

required. These steps were intended to allow the Task Decomposition process to focus exclusively on the sewing process. First, some minor corrections needed to be made to the patterns and the order of operations. This included things like slightly changing the markings used to create the welt pocket on Dress B to line up with the original garment. None were determined significant enough to warrant the making of new toiles. Corrections were made directly on to the paper patterns to save the time and expense of printing new patterns.

Figure 11: Completed Dress A (left) and Dress B (right) Reproductions

Figure 12: Snaps at waist sash of Dress A

Figure 13: Snaps at waist sash of Dress A Reproduction

Figure 14: Back neckline of Dress B

Figure 15: Back Neckline of Dress B Reproduction

Next, the pieces for both garments were cut out of the fashion fabrics. This was done slowly and deliberately to keep mistakes to a minimum. Following this, the self-covered buttons were made. This was left out of the analysis because the process was a workaround, meant to mimic the original buttons, and not an exact recreation. Finally, the pieces were bundled together and put into two separate bins. This ensured that time would not be wasted tracking down odds and ends and that the pieces would be protected when construction was not in progress.

Once the preparations were complete, the final reproduction garments were sewn. The sewing process was documented using two tools: a Task Decomposition Worksheet and a General Notes document. The Task Decomposition Worksheet was created as Microsoft Excel spreadsheet based on the Hierarchical Task Analysis with Task Decomposition as used in the Caird-Daley et al. (2013) study. The purpose of this worksheet was to provide a framework for breaking down each of the steps in the Order of Operations, essentially filling in the skills and tacit knowledge that existed between the explicit instructions. Each step in the order of operations was broken down into the actions required to complete the step. Each of these actions was put through a modified version of the Task Decomposition framework, which included the following categories:

1. *Step* - The primary goal that the action is working towards. Usually, an entry in the Order of Operations.
2. *Substep* - The immediate action being done to accomplish the overarching step.

3. *Cues and Expectancies* - What has triggered this action?
4. *Decision* - What is the problem I am trying to solve?
5. *Action/Response* - What did I do?
6. *Previously Recorded Sequence or Action?* - Have I performed and captured this action or set of actions earlier in this project?
7. *Other Possible Responses* - Is there any other action I could have reasonably chosen?
8. *Purpose* - What am I trying to achieve?
9. *Coordination Requirements* - Is there any physical dexterity required here?
10. *Likely Errors and Consequences* - What can go wrong here?
11. *Potential to Correct Errors* - Can this be fixed without irrevocably damaging the garment?
12. *Critical Values* - Do I need to change any of my machine settings? Or is there another measurement that is important?
13. *Performance Level* - Is this sequence of decisions/actions skill, rule, or knowledge based?
14. *Notes* - Additional information related to the specific task.

While most of these categories were taken directly from the framework developed by Caird-Daley et al. (2013) two important additions were made. The first was category 14; *Notes* was included to provide a place for any information that did not easily fit into

one of the other columns. This was used infrequently, and most entries were able to be folded into the primary categories when the data was reviewed later. Second, category 6, *Previously Recorded Sequence or Task,* was added to identify repeated actions. An "N" was used on new items, "T" for previously recorded tasks, and "S" for parts of a previously recorded sequence. This had two purposes: first, this allowed for a distinction between simple repeated actions and complex repeated sequences. Simple tasks, such as threading a needle are repeated numerous times across both dresses. Additionally, more complex sequences of tasks emerged as sewing progressed. Sewing most seams involved a sequence of steps consisting of positioning the fabric under the presser foot, backstitching, sewing the seam, and backstitching again. Completely analyzing each of these tasks and sequences anew each time they occurred would have been unnecessarily time consuming. Further analysis was only completed if something new occurred.

These were organized into an Excel spreadsheet, as seen in Table 1. The complete Task Decomposition worksheets are available through the University of Minnesota Digital Conservancy. Not all categories were relevant to all tasks, however, this framework allowed the information gathered to be consistent and comparable. The order of the columns was altered to align with the workflow. The most important alteration was the position of *Previously Recorded Sequence or Task.* This column was placed immediately after the *Action/Response* column. This was because if the action taken was a repeated task or sequence then, in most cases, the remaining columns could

remain empty. There was no need to fill them in if the information was redundant, though any variations from the standard task or sequence were recorded.

Any information that felt relevant but did not fit into any of the Task Decomposition columns was put into a notes column next to the relevant task. More general thoughts, those that did not apply directly to one task, were captured in a Word document dedicated to sewing notes. For example, it quickly became clear when sewing Dress A that it was easier to sew smaller stitches than larger stitches on the silk charmeuse. This thought occurred after sewing several different types of stitches on the same fabric, and so was related to more than the specific task being completed in that moment.

Phase 6: Analysis of the Task Decomposition

In this phase the data gathered from the Task Decomposition framework was analyzed. However, significant portions of the analysis were completed concurrently with Phase 6. This was both possible and necessary because in this study seamstress and the researcher were one person. If the Task Decomposition Worksheet had been filled out by someone other than the researcher, it would have been necessary to code the data separately. However, by combining the researcher and seamstress, it was inevitable that patterns would reveal themselves in real time.

After the dresses were finished, the notes taken during Phase 5 were reviewed. Patterns and insights that had been noted during the sewing process were reviewed and accepted or discarded based on their accuracy and relevancy once looked at alongside the complete data set. Next, both Task Decomposition Worksheets were reviewed to see if any additional insights could be gleaned and to gather supporting examples. The patterns, insights, and examples were then organized into their corresponding Task Decomposition category. Within each category, the relevant information and examples were presented and the differences and similarities between the two dresses were compared.

Limitations of the Study

There were several expected limitations to this study. The most significant was the small sample size. A sample of two dresses only produced so much data. While the ten additional comparison dresses did provide significant information, it would not have been feasible to reproduce them all. Additionally, as a seamstress, I was a sample of one. So, as discussed in the introduction, the study was influenced by my sewing experience and expertise. There also was some subjectivity present in some of the categories.

There was very limited information on the two garments being studied, meaning that all information was gathered from the objects themselves. It would have been useful to know the makers of the garments, exact dates of production, and/or who wore them.

Table 1: Task Decomposition Worksheet Example

Step	Substep	Cues and Expectancies	Decision	Action/ Response	Previously Recorded Sequence or Action	Purpose	Coordination Requirements	Likely Errors and Consequences	Potential to Correct Errors	Other Possible Responses	Critical Values	Performance Level	Notes
Upper Front Prep	Shoulder Tucks	Previous step complete	Do I check the needle position before starting?	Turn wheel to lower needle into fabric and observe position	N	Make the needle is aligned correctly to produce the right depth of tuck	Lower needle into fabric just enough to gauge positioning without taking a stitch	Fabric is not positioned correctly	Reverse needle and readjust fabric to achieve the correct position	Visually assess alignment without moving needle down	1/8” depth for pintucks	rule	

While this is not unusual for garments found in museum collections, it was one less point of information available.

Conclusion

In this chapter the combination of methods used and the reasoning behind this combination has been discussed. This included a garment specific material culture analysis (Severa & Horswill, 1989), Task Decomposition for extracting tacit information (Caird-Daley et al., 2013), and many others. The eight phases of this project were laid out and explained. This included the three data gathering phases and three analysis phases which provided the triangulation of data desired to bolster the validity of the findings.

Chapter 5: Analysis of Dresses and Sewing Techniques

Introduction

The purpose of this chapter is to place the two dresses that are the focus of this study within the wider context of dressmaking at the time. The goal was to show that they are aesthetically and technically consistent with other dresses within their respective time periods. While there is no way to prove definitively that Dress A was made by dressmakers and Dress B was ready-to-wear, it is possible to demonstrate that they were made with these two different sets of standards in mind.

Data Collection Process and Tool

The dresses were studied over a period of three afternoons in the research room of the Goldstein Museum of Design. Handling of the dresses was allowed with the condition that care be taken not to damage the dresses. Photography was also allowed, and so photographs were taken of relevant details (seams, interior structure, openings) to provide additional documentation for use during this analysis. These photographs were taken using a cellphone camera, which produced images good enough for documentation of construction and fabric details, though its ability to capture darker colors left something to be desired.

Analysis

The first step in analyzing the dresses was to review the data gathered and look for patterns. This included both the written data collection form and all images. Once these patterns began to emerge, a spreadsheet was created to facilitate easier comparison. It was determined that an additional framework was necessary to understand the data collected. That was found in Saiki and Stephens' (2014) paper, which uses a modified version of a quality analysis framework usually applied to modern garments to analyze 1920s evening dresses. This method divided the quality characteristics into four categories:

- Shape, silhouette, and style
- Fiber, yarn, and fabrication
- Stitches, seams, and edge finishes
- Findings and trims

The items within these categories were adapted to keep the focus on elements relevant to this study, however the four main categories remain the same.

Dresses

In total ten dresses were selected for this study: five for Dress A and five for Dress B. All were from the Goldstein Museum of Design. They were selected based on three main criteria:

- Similarity in stylistic elements – One-piece dresses intended for adult women were chosen for comparison. Dresses with similar necklines, sleeve types, and other elements were prioritized.
- Similarity in fabric – Dresses made with fabrics with similar drape, sheen, and opacity were prioritized. Dresses made primarily of chiffon or other sheer fabrics were avoided because those fabrics usually require slightly different techniques to sew. The translucent nature of these fabrics meant that the seams were often finished in different ways because they would be visible in the end product. However, it was not possible to avoid chiffon entirely because it was so often used as an accent fabric.
- Known information – Dresses with a label that gave some indication that they were made in the United States, ideally locally, were prioritized. Because the two main subjects of this study were unknown, knowing who and where the comparison dresses were made was of high importance.
- Ability to be handled – Dresses needed to be stable enough that interior construction and seams could be observed. This required significant handling that would not be appropriate for objects that were highly deteriorated.

General

To start, the dresses were sorted into two categories: Group A for the five dresses dated to the 1910s and Group B for five dresses dated to the 1920s. Throughout this analysis I compared the two groups to each other, as well as to Dress A (the 1910s primary subject dress) and Dress B (the 1924 dress). The first category that needed to be addressed was the question of *known or unknown maker*. All the comparison dresses from Group A had known makers or sellers while only 60% of the dresses from Group B did. This discrepancy was unavoidable given the available resources; however, it was decided that it was better to look at the additional examples than to omit them. The examples of unknown origin provided additional information about what sewing was done at the time and showed examples of style more like the main subjects of this study than the other examples.

The presence of *alterations* and *repairs* was also slightly different across the two groups. Group A only had one dress that showed evidence of minor repairs and alterations, with minor being defined as:

- Letting down or taking up a hem in such a way that the original length could still be deduced.
- Letting out or taking in seams in such a way that the original shape could still be deduced.
- Any repair or alteration to trim that did not change the finished design.

Group B had three dresses that had been altered and/or repaired in some way. Two of these were minor, while the third was classified as moderate. These moderate alterations included the addition of two fisheye darts on the back of the dress as well as a small amount of shaping at the waist on the side seams. These changes did not significantly alter the look of the dress (some waist shaping was built in with a belt), however, it was worth noting because it changed the construction of the dress. These and all other alterations and repairs were disregarded as they did not support the purpose of this study.

Shape, silhouette, and style

Clear differences were found when comparing the shape, silhouette, and style of dresses in Group A and dresses in Group B. *Complexity* and *skill level* were very different. Complexity was a judgment on how complicated or extensive a hypothetical instruction sheet (order of operations) would need to be to make the dress. The number of pieces and fabric manipulation techniques (gathering, pleating, etc.) were both considered. The three levels were defined as:

- Low – The order of operations is easily understood. Few extra or decorative pattern elements are used. Minimal fabric manipulation techniques are used.
- Moderate – The order of operations can be understood from observing the dress, but there is a significant amount of fabric manipulation and/or creative piecing.

Table 2: Dress Comparison Chart - General

Group	Number	Nickname	Date	Alterations	Repairs	Can be Handled?	Maker/seller information
P	1996.146.004	Dress A	1910-1918	Minor	No	Yes	No
A	1963.004.026	Burgundy Brodeen	1915	No	No	Yes	Yes
A	1964.009.001	Pink McGahn	1910-1914	No	No	Yes	Yes
A	1984.036.004	Blue English	1915-1917	No	No	Yes	Yes
A	1997.043.012	Pink Benston	1912-1915	Minor	Minor	Yes	Yes
A	CX-00147	Black Boyd	1910-1919	No	No	Yes	Yes
P	1992.004.002	Dress B	1924	No	No	Yes	No
B	1964.015.009	Blue Hollander	1923-1924	Minor	No	Yes	Yes
B	1965.008.002	Peach Bjorkman	1925-1926	No	No	Yes	Yes
B	1996.108.014	Pink Castel	1920	Moderate	No	Yes	Yes
B	1982.029.005a-b	Blue Belted	1926-1928	No	No	Yes	No
B	1997.037.002	Blue Swirls	1920-1929	Minor	Minor	Yes	No

- High – The order of operations is very difficult to discern and would likely involve some experimentation or additional research to understand. Many different, overlapping pieces and/or fabric manipulation techniques are used in construction.

Skill level was a judgment of the level of skill a seamstress would need to sew the garment together. It considered the complexity of the garment, but also the difficulty of the fabric and the seam finishes. These skill levels were based on the ability of modern sewers, specifically the skill levels I saw when training students in a theater costume shop. Those students usually started with no sewing knowledge and were trained on the job, roughly 20 hours a week. The three levels were:

- Novice – A person with less than one year of sewing experience. They would have basic skills like sewing straight seams, sewing a set-in sleeve, and following an order of operations, but would not have the manual dexterity to work with very difficult/slippery fabrics. Sewing may be a bit sloppy.
- Intermediate – Able to work with slippery or sheer fabrics, finer time intensive finishes on seams, and/or complex construction. Sewn by someone comfortable with garments where the order of operations involves more or more complicated steps.
- Expert – Able to work on high complexity garments involving many overlapping layers and techniques. Able to handle delicate or slippery fabrics.

The garments in Group A were primarily (80%) of high complexity. Skill level in this group was rated at expert (60%) or intermediate (40%). In contrast, Group B garments were split between high (40%), moderate (20%), and low (40%) complexity and were judged to be sewn by a mix of expert (40%), intermediate (20%), and novice (40%) seamstresses. These findings from Group A and Group B were in line with the evaluations of Dress A and Dress B. Dress A was a high complexity dress with expert grade sewing and Dress B was a moderate complexity dress with intermediate grade sewing.

While both measurements were subjective, based on the sewing knowledge of the researcher, they were supported by other, more concrete findings. In terms of structure, the biggest difference between the two was the inclusion of an *underbodice* or *waist stay*. All the Group A dresses had these features. In most cases underbodices were made of a fine cotton tulle netting. The waist stay was made from a petersham or grosgrain ribbon, though fabric was used as well. Some were further supported with *boning*, but not all. Of the Group B dresses, only one had an underbodice and waist stay[1]. Stylistically, this manifested in the *waist placement.* Group A dresses all had some form of waist definition at the natural waist. Group B dresses had dropped waists (60%) or no waist definition at all (40%). Again, the primary dresses fit into their respective categories,

[1] There are a few possible explanations for that inconsistency. The dress (Blue Hollander, 1964.015.009), dated from 1923-1924, may have been made for or by someone who was not concerned with current fashion. It is also possible that the dress is slightly misdated and represents a transitional style from a few years earlier.

with Dress A having a net underbodice waist stay at the natural waist and Dress B having no understructure and an undefined waist.

Table 3: Dress Comparison Chart - Shape, Silhouette, and Style (pt. 1)

Group	Number	Complexity	Skill level	Underbodice	Waist stay	Boning	Waist placement
P	1996.146.004	High	Expert	Yes	yes	No	Natural
A	1963.004.026	Moderate	intermediate	Yes	Yes	No	Natural
A	1964.009.001	High	Expert	Yes	Yes	Yes	Natural
A	1984.036.004	High	Intermediate	Yes	Yes	Yes	Natural
A	1997.043.012	High	Expert	Yes	Yes	Yes	Natural
A	CX-00147	High	Expert	Yes	Yes	Yes	Natural
P	1992.004.002	Moderate	Intermediate	No	No	No	None
B	1964.015.009	High	Expert	Yes	Yes	No	Hip
B	1965.008.002	High	Expert	No	No	No	None
B	1996.108.014	Low	Novice	No	No	No	Hip
B	1982.029.005a-b	Moderate	Intermediate	No	No	No	Hip
B	1997.037.002	Low	Novice	No	No	No	None

Sleeve attachment and *sleeve type* were additional points of structural difference between the groups. Sleeves in Group A were either attached to the underbodice (60%) or classified as complex. Complex sleeves involved multiple layers attached to the bodice, underbodice, or some combination thereof. Some of these may have been partially or fully set-in, but taken as a whole they could not be seen as equivalent to a standard simple set-in sleeve. Most of the sleeves were set-in (60%), exceptions were sewn in non-standardized ways. Garments in Group B were primarily (60%) standard set-in sleeves. The exceptions were one sleeveless garment and the previously discussed Blue Hollander dress which used a complex sleeve attachment method. The primary

dresses fit into this pattern with Dress A having sleeves attached to its underbodice and Dress B using standard set-in sleeves attached to the main body of the dress.

Table 4: Dress Comparison Chart - Shape, Silhouette, and Style (pt. 2)

Group	Number	Sleeve type	Sleeve attachment	Sleeve length	Cuff	Decorative details	Decorative details bodice	Decorative details skirt
P	1996.146.004	Set in	Underbodice	Long	Yes	Yes	Collar, Bib,	Sash/bow, overlayer, inset, pleats
A	1963.004.026	Set in	Underbodice	three-quarter	Yes	Yes	Ruffles, tucks	Sash/bow
A	1964.009.001	Other	Underbodice	Long	No	Yes	Flounces/ ruffles sleeves, Bib, Neckline Modesty panel	Sash/bow, overlayer
A	1984.036.004	set in	Underbodice	long	Yes	Yes	Collar, Bib	Sash/bow, overlayer
A	1997.043.012	Set in	Complex	Three-quarter	No	Yes	Overlayer	Sash/bow, overlayer
A	CX-00147	Other	Complex	Short	No	Yes	Flounces/ruffles sleeves	Flounces/ ruffles skirt
P	1992.004.002	Set in	Bodice	long	Yes	Yes	Collar, tie	Overlayer, welt pockets
B	1964.015.009	Set in	Complex	Long	Yes	Yes	Overlayer	Sash/bow, overlayer
B	1965.008.002	None	NA	NA	NA	Yes	Overlayer	Overlayer
B	1996.108.014	Set in	Bodice	Long	No	Yes	Flounces/ruffles sleeves, tie at neck	Belt, ruffles/flounce
B	1982.029.005 a-b	Set in	Bodice	Long	Yes	Yes	Collar, modesty panel, back yoke	Belt, pleats
B	1997.037.002	Set in	Bodice	Long	Yes	No	NA	NA

Fiber, yarn, and fabrication

The main point of differentiation in fabrication between Group A and Group B was not in the kinds of textiles used, but rather in the number of *textiles used for each dress*. Group A dresses averaged 5.6 fabrics used in each dress, while Group B dresses averaged 2.2 fabrics used. This number includes self-fabric, contrast fabrics (including lace fabric, but not lace trim), lining fabrics, and fabrics used for understructure (but not ribbons used for understructure). The primary dresses fell in line with this pattern, with Dress A using twice as many different textiles (4) as Dress B (2).

In contrast, the textiles used across Group A and Group B did not show a great deal of difference in terms of the *primary fabric fiber* used in each dress. This was partially due to the selection process, as dresses with similar fabrics to Dress A and Dress B were prioritized. With Dress A being made primarily of a silk charmeuse and Dress B a moderate weight, plainwoven repp fabric - most likely rayon - dresses made from drapey opaque fabrics were prioritized.

As the subjects of this study were all museum pieces, burn tests, microscopic analysis, and other scientific methods of identification were not possible, so identification was done by visual and tactile analysis. Of the five garments in Group A nearly all (80%) had a primary textile made of silk. The remaining garment (20%) was made from a suiting weight wool flannel. Group B also had nearly all (80%) garments with a primary fiber of silk. The last garment was somewhat ambiguous. From the outside the

dress looked like it was made of silk charmeuse, however it had a little more body and stiffness than would be expected. On closer inspection it was a crepe-back warp-faced satin with a warp that may be silk, and the weft feels too stiff and scratchy to be silk. Regardless, the handling of the fabric, which is our primary focus here, would not be significantly different from a similar weight silk. The *primary fabric structure* of these garments was a similarly distributed mix of satin (Group A 40%, Group B 40%) and plainwoven variations (Group A 60%, Group B 60%). Both balanced and unbalanced plainwoven fabrics were used as primary fabrics, including chiffon and taffeta.

Table 5: Dress Comparison Chart - Fiber, Yarn, and Fabrication

Group	Number	Number of textiles used	Primary fiber	Primary structure	fabric combinations
P	1996.146.004	4	Silk	Satin	Satin, chiffon, brocade, net
A	1963.004.026	4	Silk	Plainwoven (taffeta)	Taffeta, china silk, net
A	1964.009.001	9	Silk	Plainwoven (repp crepe)	Crepe, chiffon, velvet, herringbone twill, satin, net, lace
A	1984.036.004	5	Wool	Plainwoven (flannel)	Wool, lace, repp lining, net, plainwoven cotton
A	1997.043.012	5	Silk	Plainwoven (chiffon)	Chiffon, net, lace
A	CX-00147	5	silk	satin	Satin, net, taffeta, lace
P	1992.004.002	2	Rayon	Plainwoven (repp)	Crepe and china silk lining
B	1964.015.009	3	Silk	satin	satin, net, china silk
B	1965.008.002	2	Silk	Plainwoven (chiffon)	Satin, chiffon
B	1996.108.014	2	Silk	Plainwoven (repp)	Plainwoven, lace
B	1982.029.005a-b	2	Silk (?)	Satin	Satin and satin
B	1997.037.002	2	Silk	Plainwoven (balanced)	plainwoven, silk and wool

Secondary fabrics used only produced one clear pattern: Net was used in all the Group A dresses and none of the Group B dresses. In all cases, the net was used in the underbodice of the Group A dresses. The one Group B dress with an underbodice used a lightweight plainwoven silk for its underbodice, which further supports the theory that it was a dress made using a method that was outdated at the time. Otherwise, a wide variety of secondary fabrics were used, with no discernable pattern.

Stitches, seams, and edge finishes

Stitch type and *stitch quality* were found to be very similar across both groups. Both groups primarily were made using a mix of lockstitches (ISO category 300) and hand stitches (ISO category 200). There was an additional stitch used on some lightweight fabrics (60% Group A, 40% Group B), however, this was only used to finish the edges, not to join pieces together. The machine stitches on all the garments were determined to be of high quality, however for the purposes of this study that was defined by the researcher as "having balanced tension and being sewn without any obvious deviations from the intended seam line." Hand stitches were determined to be of moderate quality for all garments. The definition of moderate being "the majority of stitches are even and neat with some large or sloppy stitches, primarily in awkward areas or where attaching findings and trim."

Table 6: Dress Comparison Chart - Stitches, Seams, and Edge Finishes

Group	Number	Stitch type: 300 Lockstich	Stitch quality: 300 lockstitch	Stitch type: 200 Hand	Stitch quality: 200 Hand	Stitch frequency: 200 Hand	Stitch type: other	French	Plain
P	1996.146.004	Yes	High	Yes	Moderate	High	No	Yes	Yes
A	1963.004.026	Yes	High	Yes	Moderate	High	Yes	Yes	Yes
A	1964.009.001	Yes	High	Yes	Moderate	High	Yes	Yes	Yes
A	1984.036.004	Yes	High	Yes	Moderate	High	No	Yes	Yes
A	1997.043.012	Yes	High	Yes	Moderate	Moderate	Yes	Yes	Yes
A	CX-00147	Yes	High	Yes	Moderate	High	No	No	Yes
P	1992.004.002	Yes	High	Yes	Moderate	Low	No	No	Yes
B	1964.015.009	Yes	High	Yes	Moderate	Moderate	Yes	Yes	Yes
B	1965.008.002	Yes	High	Yes	Moderate	Low	Yes	Yes	Yes
B	1996.108.014	Yes	High	Yes	Moderate	Low	No	No	Yes
B	1982.029.005a-b	Yes	High	Yes	Moderate	Moderate	No	No	Yes
B	1997.037.002	Yes	High	Yes	Moderate	Low	No	No	Yes

Group	Number	Selvage edge	Pinked	Hand overcast	Enclosed	Bias faced	Turn and stitch	Bound seam	Bias bound edge	Piped edge
P	1996.146.004	No	No	Yes	Yes	Yes	Yes	No	No	No
A	1963.004.026	Yes	No	Yes	Yes	No	No	No	No	No
A	1964.009.001	Yes	Yes	Yes	Yes	No	No	No	Yes	No
A	1984.036.004	Yes	No	Yes	Yes	Yes	No	No	No	No
A	1997.043.012	No	No	No	Yes	No	No	No	No	No
A	CX-00147	Yes	Yes	Yes	Yes	Yes	No	No	No	No
P	1992.004.002	No	Yes	No	Yes	Yes	Yes	No	No	Yes
B	1964.015.009	Yes	No	No	Yes	Yes	No	No	Yes	No
B	1965.008.002	No	No	No	Yes	No	Yes	No	Yes	No
B	1996.108.014	Yes	Yes	No	Yes	No	No	No	Yes	No
B	1982.029.005a-b	No	Yes	No	Yes	No	Yes	Yes	No	No
B	1997.037.002		No	No	No	No	No	No	Yes	No

The difference between the two groups was evident, however, when the stitch *frequency* of the hand stitches is explored. This category was divided into three levels:

- Low: Hand stitches found on cuffs, neckline, and/or findings, as well as on at least one layer of skirt hem.
- Moderate: Hand stitches found throughout. This includes cuffs, neckline, findings, and/or skirt hem as well as on at the waistline and on the bodice. Does not include hand overcasting on seams.
- High: Hand stitches found throughout. This includes cuffs, neckline, findings, and/or skirt hem as well as on at the waistline and on the bodice. Must include hand overcasting on seams.

Every one of the Group A dresses but one (80%) had a high level of hand sewing. The Group B dresses were significantly lower with 40% (a moderate level) and 60% (a low level.) Dress A (high) and Dress B (low) fit within these findings.

The last area of significant difference between the two groups of dresses was in the presence or absence of a *bias bound edge*. Most dresses in Group B (80%) had this feature, usually on the neckline. This quick way of finishing a raw edge was not seen in Group A or in Dress A. Dress B used a slightly different method of finishing the edges of its neckline which involved a cord within a bias strip. From the outside, this looked similar to the bias binding method used by most of the other Group B dresses, and in fact emphasized this finish. That being so, it was safe to conclude that a visible bias

strip at the neckline was considered a common, maybe even desirable, finish in the 1920s, and that Dress B was in line with the norms of the time.

Findings and trims

The last category that was analyzed focused on the findings and trims used in the garments. The sample was too small to yield any interesting results related to trims, with *lace*, *embroidery/beading*, and *self-trim* appearing with no discernable pattern. The category of *self-covered buttons* also did not reveal any strong findings. This type of button only showed up in one dress in the comparison groups – the Blue English from Group A. However, both Dress A and Dress B used these buttons as decoration.

Of more interest was the category of findings. Some differences were illustrated by looking at the types of findings used. Most dresses in Group A used both *snaps* (80%) and *hooks and eyes* (100%). In contrast, some (40%) of the Group B dresses used hooks and eyes but more (60%) used snaps. Only one dress (20%) used both, and another dress (20%) used no closure at all. Group B dresses were also the only ones to use buckles. In both cases (40%) the buckles were used on fabric belts at the low waist. Dress A fell in line with these findings by using both snaps and hooks and eyes but not buckles. Dress B also fits within its group by only using snaps.

The biggest difference between Group A and Group B was found in the *closure complexity.* This placed the dresses into one of four different categories based on how a woman would get into and out of the dress. These categories were:

- None – The Dress is pulled on over the head with no closures of any kind.
- Simple – The dress goes on over the head with a bare minimum of snaps, buttons, hooks, or buckles used at the neckline, cuffs, bra strap carriers, or belt.
- Moderate – The dress opens at front, back, or side through one layer and/or along one continuous line. Any snaps or hooks and eyes used close the layer completely.
- Complex – The dress uses numerous snaps and/or hooks and eyes to open and close. These are not along a continuous line and may overlap. The layers may not have openings in the same location.

Decorative buttons, those that cannot be used to get into and out of a dress, were not considered here. Group A dresses were all (100%) in the complex category. These dresses tended to have a center front opening in the underbodice closed with hooks and eyes while the closures for the over bodice were primarily snaps which were positioned to blend in with the style lines of the specific garment. Only one Group B dress fell into the complex category, the same Blue Hollander with the old-fashioned construction style. The remaining Group B dresses (80%) were in the simple category. Once again, Dress A

and Dress B fit well within this structure. Dress A had a complex closure system that used hooks and eyes at the underbodice with concealed snap closures on the outer layer, and Dress B went on over the head with the only functional closures being snaps at each wrist.

Conclusion

Based on these findings, it is possible to conclude that, on a technical level, Dress A and Dress B are representative of the sewing standards and methods used in their respective time periods. These differences were not just the result of a stylistic change but of a change in how clothing was made. Significant reduction in the inner structure, number of fabrics used, amount of hand sewing, and complexity of openings pointed to a change in what constituted acceptable construction quality in garments from the 1910s to the 1920s. This past chapter established that the two dresses slated for reproduction were, in fact, typical examples of their time periods in terms of construction techniques and style, thus making them suitable samples for the next phase of this study.

Table 7: Dress Comparison Chart - Findings and Trims

Group	Number	Self covered buttons	Self trim	Lace	Embroidery/ beading/ Applique	Snaps	hooks and eyes	Buttons	Buckle	Closure complexity
P	1996.146.004	Yes	No	Yes	No	Yes	Yes	Nonfunctional	No	Complex
A	1963.004.026	No	Yes	Yes	Yes	Yes	Yes	No	No	Complex
A	1964.009.001	No	No	Yes	No	Yes	Yes	No	No	Complex
A	1984.036.004	Yes	No	Yes	No	Yes	Yes	Functional	No	Complex
A	1997.043.012	No	No	Yes	Yes	Yes	Yes	No	No	Complex
A	CX-00147	No	No	Yes	Yes	No	Yes	No	No	Complex
P	1992.004.002	Yes	No	No	No	Yes	No	Nonfunctional	No	Simple
B	1964.015.009	No	No	No	Yes	Yes	Yes	No	No	Complex
B	1965.008.002	No	No	No	Yes	Yes	No	No	No	Simple
B	1996.108.014	No	No	Yes	No	No	No	No	Yes	Simple
B	1982.029.005a-b	No	No	No	Yes	Yes	No	No	Yes	Simple
B	1997.037.002	No	No	No	Yes	No	Yes	No	No	Simple

Chapter 6: Analysis of Pattern Making and Sewing Preparation

The last chapter shows that both Dress A and Dress B are non-exceptional examples of dresses created during their respective decades. A difference in the level of complexity and method of construction is clearly present. The aim of this chapter is to further support these observational findings through the action of recreation. More specifically, this chapter analyzes the findings from the experimentation phase of the recreation process using Severa and Horswil's (1989) material culture analysis framework. This encompassed creating sewing patterns, sewing toiles, and creating a series of small sewing technique samples using functionally authentic materials for both Dress A and Dress B.

Dress A

Identification

The exact construction date of Dress A is unknown, but the catalog record at the Goldstein Museum of Design places it between 1910 and 1918. The findings in chapter 4 support this and establish that the dress is representative of this period in construction and style. The dress has a few minor alterations (most notably the sleeves have been let out), but there were no repairs. The maker is unknown.

The construction of this dress is complex. Long set-in sleeves with decorative cuffs are attached to a net underbodice. That, along with a silk over bodice and bib, are

joined to the skirt by a wide grosgrain ribbon waist stay. There is no boning, interfacing, or other structure in the dress, though it would have been worn with a corset and other foundation garments. The waist stay would hit at the natural waist, and the hem of the skirt would fall to at least the ankle. Around the waist is a wide bias-cut sash. Two additional pieces, cut on the strait of grain, hang down from the side waist, providing the illusion of a tied sash. A flat collar and bib finish the bodice, while a reflected bib provides decoration below the waist.

A lightweight and drapey silk charmeuse fabric is the main material used in this dress. At the front center of the skirt a decorative panel of silk chiffon is heavily pleated. In several locations a two-toned pink damask is used as an accent. This accent fabric is largely hidden, used on the underside of the cuffs, collar, and parts of the sash. The fiber content of this textile is unknown but is most likely silk or a silk blend.

Dress A was sewn using a mix of hand and machine sewing. The machine sewn portions were limited to:

- Long straight seams joining the skirt panels
- Side seam and shoulder seams on the bodice and underbodice
- Side seams and darts on the sleeves
- Seams attaching the sleeves to the underbodice
- Seams attaching the bodice and skirt to the waist stay

These were sewn using a lockstitch. Multiple different hand stitches were used, including running stitch, whip stitch, and catch stitch. Seams were finished a variety of ways, including turn and stitch, French, and hand overcast.

With so much interest coming from the use of fabrics, Dress A had little additional ornamentation. A small amount of lace was used on the underbodice; however, this was not visible when the dress was worn. The most prominent decoration on the dress was the self-covered acorn-shaped buttons. These were all non-functional, though some of them did provide cover for actual closures. These closures consisted of a mix of metal snaps and hooks and eyes.

Evaluation

The first realization that came from making the pattern for this piece was that not all the pieces were really part of the pattern. Many were scraps or bias strips fashioned without a pattern, probably as needed as the seamstress worked. For example, a small piece of self-fabric was used to finish an inside edge in the front flap. The small pieces were eliminated from the list of needed pattern pieces. This decision was made based on the knowledge that the careful pre-cutting of these pieces would not have been true to the method of construction used in Dress A. Those pieces were clearly cut to size as needed from scrap material, not pre-planned and provided to the seamstress by the cutter. As the goal of the process was to replicate the experience of sewing the dresses, rather than

exactly reproduce the example dresses, pre-cutting the pieces would be in conflict with the priorities of this project.

Additionally, there were some areas that were pieced together for no obvious reason other than to conserve fabric. This was present in the sash pieces as well as under the lower flap. These pattern pieces were simplified, however, one area of piecing, where the upper flap meets a thin crescent was preserved. While this appeared to be intended to correct a cutting error and raise the neckline, it also provided some shaping to the final piece so, it was copied directly.

Even after eliminating these excess pieces, the overall pattern still contained nineteen distinct pieces. Several of these were simple rectangles. The pieces for the skirt, hanging sash, cuffs, and collar were all rectangles cut on grain. The waist sash pieces were rectangles cut on the bias. Bodice pieces and facings were more complex but would be recognizable to anyone familiar with modern garment pieces.

The most complex piece to pattern was the sleeve. The shape was related to the standard set-in sleeve, with a few significant deviations. First, the sleeve was not divided evenly along the vertical line. Rather the main seam is shifted forward so that the curve of the sleeve cap begins at the seam. The result is an S-shaped top edge, rather than the modern U-shaped upper. Second, a wide dart ran from the wrist to the elbow. Creating a pattern piece that reflected these two design specifications and at the same time matched the measurements taken from the original garment was difficult. It was only by curving

the main seam on the sleeve that the measurements worked. Looking at pattern drafting books from this period revealed that the final shape devised (Figure 11) was an accurate representation of the one-piece tight sleeve common during the period (Fales, 1917, p. 269 and Allington, 1913, p. 90).

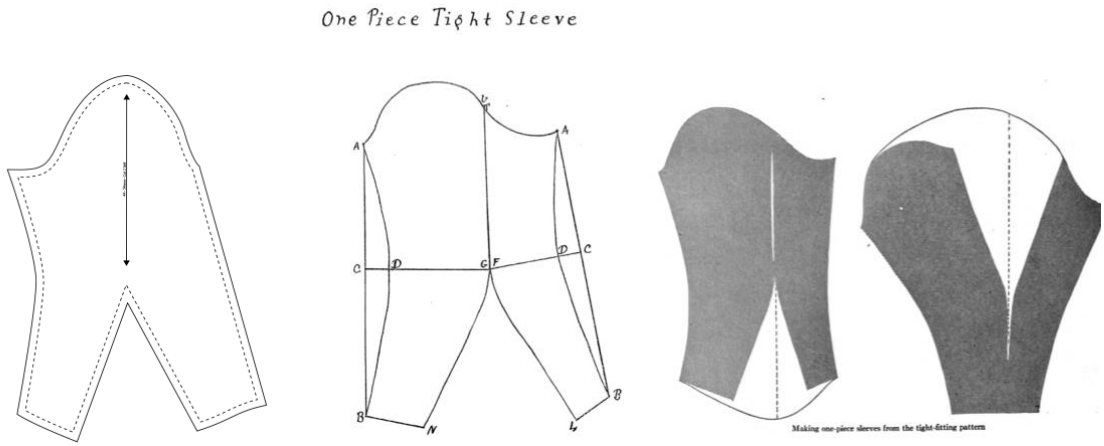

Figure 16 Left: Dress A Sleeve Pattern Piece, Center: Fales One Piece Tight Sleeve, Right: Allington One-Piece Sleeve

The most time-consuming part of sewing the toile for Dress A was the large amount of hand sewing involved. Machine stitches were used on long, mostly straight seams, but the remainder of the sewing was all by hand. This included sewing to join pieces together, finish edges, and apply findings. Skipping the edge finishing was considered, as that was common when making toiles for other uses. However, the reason for those other toiles was usually to check fit, which was not the goal of this one. So, skipping the edge finishing was not appropriate in the context of this project and it was

completed. This allowed for the finishing of edges to be included correctly in the order of operations.

The most important part of sewing the toile, however, was that it allowed me to gain a much better understanding of the construction of the dress as a whole process. When looking at the overall construction of the dress, it was easy to get lost in the small details and confused by the many layers. However, through the process of reproduction, the logic of the dress became clear. The way the dress was put together makes it difficult to copy but would, in contrast, have made it easy to fit and construct.

The primary key to this construction was in the use of a waist stay and a net underbodice. This underbodice could have been produced in shop, however, they also were available for purchase. The skirt, bodice, and overbodice were constructed first in their entirety. Then they were eased and gathered to fit to the waist stay. This resulted in a dress with a tightly fitted waist without precise patternmaking being necessary during early construction. A general idea of the woman's figure was necessary but there was enough ease in the hips and bust that some variation would have been fine. Another benefit of this order of operations was that the waist sash conceals most of the messiest parts of the construction. This meant that little time had to be devoted to finishing the many seams that converged at the waist, and inaccuracies could be easily concealed. Additionally, the use of the underbodice allowed for the shoulders and sleeve length to be adjusted without necessitating the removal of the sleeve. This was represented in the

small tucks at the shoulders of the underbodice. Finally, small details could be decided upon late into the dressmaking process. In this case, the sleeve cuffs were sewn on top of the sleeve after all other construction in that section was complete. This would have enabled the wearer to choose what style of cuffs they wanted up through the final fitting. The placement of other elements, like the decorative buttons, could have been decided last minute.

Sewing the self-fabric and contrast fabric samples also provided insights. The fabrics involved in the construction of this dress were ones well known to be difficult to sew. The majority of the dress was made of silk charmeuse, a thin, light, slippery fabric that shows every error and flaw. Silk chiffon was used in the skirt, another difficult to control material. The net used in the bodice also proved challenging with its open structure and tendency to stretch. The only fabric that was not difficult was damask used as an accent fabric. This was a stable, easy to work with material that presented no problems.

Cultural Analysis

The above suggests that Dress A was produced in a fashion system where pleasing an individual customer was the highest priority. The sewing processes were streamlined only so much as to allow for custom fit and custom design. The construction of the dress was not standardized in a way that would allow for multiple copies to be

made easily. The shortcuts that were taken showed a desire to speed up the process of making this individual dress, not to eliminate any future work.

Also clear in the construction of this dress was the ready availability of inexpensive sewing labor. There was nothing in the dress that suggested it was a particularly special garment. There was no label from a well-known dressmaker or costly ornamentation or decoration. The dress was not a special evening piece or made from an especially showy fabric. There was no evidence that an important or highly regarded person wore it. Yet, there were many hours of handwork involved in its creation. This indicated that this amount of handwork was not unusual and not limited to garments worn at the highest level of society.

Interpretation and Intuitive Analysis

Based on the above evidence, I believe this dress was a custom-made dress designed for, and with the input of, a single client. Dress A showed signs of having been adjusted to fit that client, particularly at the front bodice, where a hidden panel was added that had the effect of raising the neckline. The dress was constructed in such a way that sewing the original dress would have been much easier than any attempt to make duplicates. Many pieces appeared to be irregular in a way that would suggest that at least one mid-construction fitting took place.

Overall, the patterning for this dress was complex when necessary, but pieces were simplified whenever possible. The sleeve style suggested that the cutter could have either been professionally trained or working from a patternmaking system. Patching together scraps in some areas indicated that cost was a concern and that fabric was highly valued. The improvisational nature of the dress, particularly the scrap pieces used to finish edges mentioned above, suggests that this was made by a dressmaker and not by a home seamstress.

There was no indication that the dress was sewn only by one seamstress, and it appeared likely that multiple people worked on it at different times. The order of operations revealed that the skirt, bodice, and sash sections could easily have been worked on independently before being assembled in a final production phase. This illustrated the division of labor reflected in accounts of dressmaker shops at the time, with seamstresses specializing in different parts of the garments.

The great amount of handwork further supports the idea that multiple seamstresses were involved. One person working on the dress from start to finish would have meant that a seamstress capable of constructing the more complex sleeves or bodice would have spent significant time on much simpler tasks. For example, that level of skill was in no way required to finish the seams inside of the skirt. This would not have been an efficient use of labor.

The resulting picture of the conditions in which this dress was made point to a small workshop in which multiple hands, most likely women, worked on this dress under the direction of a dressmaker for a specific client. This dressmaking shop would not have been the most expensive in town, as evident by the conservative use of fabric, but it likely also was not considered the best shop in town either. The dressmaker in charge was likely successful enough to have developed the business, but she would have been serving a middle-class clientele. This was further supported by the patterning and assembly of the dress, which would have minimized the need for fittings. The seamstresses would have been of different levels of skill, with pay reflecting that. An apprentice may have worked on longer skirt seams, while a professional would have been required for assembly of the bodice. The dress would have been an unremarkable commission, one of many similar but still unique styles, likely forgotten as soon as it was out the door.

Dress B

Identification

Dress B was, according to museum records, made in 1924 by an unknown maker. In the previous chapter, it was determined that its style and method of construction were consistent with other dresses from that period. It showed no signs of having been altered since its original construction. The dress was designed to be put on over the head, with

no closures needed to get in or out. There was no defined waist and no internal boning or other structure. Five pin tucks at each shoulder were the only shaping elements in the dress. A flat collar sewn to the bodice extended below the neckline. The neckline was finished with self-covered piping. A pair of tasseled ties extended below the waist. Two small jetted[2] pockets sat at approximately hip height. A double layered hem was present on the front, but was not continued on the back, which was devoid of any construction details. The dress was of a mid-length, hitting at mid-calf when placed on the mannequins used by GMD. The most significant ornamental elements on this dress were the two rows of twenty-nine self-covered buttons and loops that ran down the side seams. These buttons were non-functional, and purely for decorative purposes. The dress had two closely fitted long set-in sleeves. These were finished with the same piping as the neckline and closed with one small set of snaps each.

Dress B is constructed primarily from a type of Japanese crepe fabric known as Chirimin, in a mid-tone grey. This is an unbalanced plain woven repp fabric with heavily twisted weft yarns. The result is a mid-weight fabric with a visible wave texture that is nicely balanced between drapey and stable. This is most likely made of rayon but could also be silk. Additionally, a light weight plainwoven off-white china silk is used as a lining under the front bodice and for the pocket bags. There is no interfacing used to provide structure in the body of the dress, however, a cotton cord is used inside of the

[2] Jetted pockets are also known as double welt or bound pockets (Cottenden, 2019).

piping at the wrists and neckline. The primary decorative feature on the dress is the two rows of buttons mentioned above. These are made by covering the front and back of a base, presumably metal, with self-fabric. Additional ornamentation is provided by two large tassels suspended from the ties at the neckline.

This dress is primarily sewn using a machine lockstitch. The stitches are even and steadily sewn throughout. Hand stitches are used in several places. These vary in quality, but in general are on the large side. This does not affect the finished appearance of the dress however, as they do not show through to the outside of the dress. The hems are finished with large, even slip stitches sewn by hand. Several different seam finishes are used on the inside of the dress. Some are simply pinked. Others are turn and stitch. One, where the inner lining joins the lower skirt is a French seam.

Evaluation

In the process of creating the pattern, the observational findings were reinforced. The pattern pieces were universally simple in shape. Most of the pieces were not too far removed from the basic blocks from which may have been created. There was an economy to the pieces, as was evidenced by a preference for folding pieces in half, rather than cutting two and sewing them together. Only one facing piece was needed, as the neck and sleeve hems were finished by a piped bias. The most complicated pattern piece was the upper front, as that was where all the details were located. The pattern also

lacked significant shaping, meaning that multiple women could conceivably wear the finished product without needing alterations.

Assembling the toile for Dress B was relatively fast and straightforward. Most of the detail work focused on the front of the dress. The area's most likely to cause issues - the shoulder pintucks and jetted hip pockets - needed to be completed before attaching the upper front piece to the rest of the garment. The loops for the buttons at the sides of the dress were attached to a facing first, which allowed this piece of time-consuming work to be done without touching the rest of the dress. Once assembled, attaching this piece was easy and provided a nice, finished edge. The most important sewing skill needed here was the ability to sew piping evenly and consistently. If available, the shop may have used a special foot for this process. Finally, working through the sewing of this dress revealed that all hand sewing could be left until the very end.

Sewing the self-fabric and contrast-fabric samples was easier than expected. The chirimin fabric was surprisingly easy to work with. It maintained its shape when sewn. There were no problems with distortion or stretching. There was surprisingly little raveling when working with this fabric. With the unbalanced weave and smooth, tightly spun yarns, it would not have been surprising to have significant issues with loose yarns, but the fabric was quite stable. The chirimin was smooth enough to turn easily when sewn into bias tubes for the button loops. Given its thickness, this was a very pleasant surprise. The thickness of the fabric was also beneficial during hand sewing. Stitches

could be sewn quickly and without much care and they still appeared invisible on the right side of the fabric.

Cultural Analysis

This dress was not made with an individual client in mind. Rather, it was created to be sewn easily and efficiently. The seamstresses sewing the dress would not have had to consider the whims or schedule of a client, but still would not have been their own masters when it came to sewing. There likely would have been more than one seamstress working on the dress, however, there may not have been a wide range of skill levels needed. The seamstress who worked on the jetted pockets and pintucks may have been the most skilled, but basic home-sewing experience was all that would be needed to make this dress.

Interpretation and Intuitive Analysis

This dress represents a piece of ready-to-wear, a dress designed not to be specific to one person, but rather to be usable to the largest possible group of women. The pattern pieces are simple and make efficient use of fabric, suggesting that economy is important. Additionally, this dress has little shaping and would be difficult to alter. This allows it to fit a wide range of body types but also does not allow for customization, suggesting that this is a piece of ready-to-wear, not a custom dress.

Overall, the sewing of this dress would be very easy to compartmentalize. Time consuming elements, like attaching the button loops to the facing, could be the task of one group of seamstresses. Other seamstresses could easily be working on several other elements of the dress concurrently. Additionally, there is no evidence of custom fitting. Both of these suggest it would be a very suitable design for production in volume at a ready-to-wear factory

The fabric choice is unusual, and the fiber content is uncertain, so it is not possible to estimate the cost of the fabric used. However, a high level of skill is not required to work with this material. An inexperienced or rushed seamstress could make most parts of this dress to an adequate standard using the chosen fabric. This is likely a conscious choice made on the part of the designer so that they do not need to pay as much for labor.

Conclusion

The two dresses represent two different modes of garment production, but there is more in common than not in their method of patterning and consequently construction. The patterns for both dress A and B seek to use materials efficiently and rely on similar simple shapes. Additionally, both Dress A and Dress B can be divided into discrete units and worked on by multiple hands. The design and any corresponding sense of ownership then would not fall to those who do the actual sewing in either case. However, the skill

level of those making Dress A is more varied and at times requires more experienced seamstresses than that of Dress B. The act of sewing Dress A therefore may have been more stressful to the seamstress than Dress B, with the deadlines imposed by a client being more immediate and the necessary hand work slower to complete. However, the monotony of factory work (even on a small scale) is not to be underestimated.

Chapter 7: Analysis of Task Decomposition

This chapter looks at the information gathered from the Task Decomposition process. Insights captured by each of the twelve columns of the Task Decomposition worksheet were documented throughout the creation of the reproduction garments. Unlike the muslin toiles and fashion-fabric technique samples discussed in the previous chapter, the final reproduction garments were complete garments sewn using fashion fabrics and functionally authentic notions. The patterns found within this data are presented and discussed below. They were organized by the column of the Task Decomposition worksheet that they most strongly related to. This began with *Step and Sub-Step*, followed by *Cues and Expectancies*, *Decision*, *Action/Response*, *Purpose*, *Coordination Requirements*, *Likely Errors and Consequences*, *Potential to Correct Errors*, *Other Possible Responses*, *Critical Values*, and *Performance Level*. These findings relate to the research question identified earlier:

- What changes in tacit knowledge and sewing skills are required by seamstresses during this period when the custom-made clothing industry rapidly declined, and the ready-to-wear industry reached maturation

Step and Sub-step

It was difficult to directly compare the steps involved in each dress, because what constitutes a *step* or a *sub-step* can be somewhat subjective. Here *step* was defined as all *sub-steps* that must be completed on a given pattern piece or group of pieces (section) before they could be joined with another section or progress may otherwise be made. A *sub-step* was a single sewing operation, such as a seam or a hem. Sewing a seam and finishing a seam were two different steps. Sewing the hem on the front and back of a garment was a single step, even though it passed over two different pattern pieces.

Dress A and Dress B are so different in their construction that they also differ in terms of the steps needed for construction. As seen in Table 7, the sewing of both Dress A and Dress B easily works out to sixteen steps, however, many of these steps are not easily comparable. There is no skirt flap on Dress B and no shoulder tucks on Dress A. Stay stitching the hem on Dress B is listed as an independent step because of where it falls in the order of operations. While at the same time, assembling the skirt on Dress A is a single step that has many, sometimes complicated, sub-steps. However, two of these steps reveal themselves as suitable for comparison: the sleeves and collar assembly.

Table 8: Step Comparison

Dress A	Dress B
Skirt	Prep covered cording for loops
Skirt Flap	Prep corded bias tape (for neckline and pockets)
Underbodice	Prep ties
Underbodice to waist stay	Shoulder tucks
Cuffs	Pockets
Sleeves	Loops
Collar	Upper hem
Over bodice	Lower Skirt to interlining
Over bodice flap	Interlining/lower skirt to B1
Over bodice waist stay	Front to Back Shoulders
Skirt to waist stay	Neckline
Upper ash assembly	Collar
Upper ash to dress	Front to back side seam
Lower sash assembly	Stay stitch hem
Lower sash to dress	Sleeves
Finishing (snaps and buttons)	Finishing (hand slipstitched hems and snaps)

Assembling the collars for both Dress A and Dress B was a nearly identical process. In both cases, the collar and undercollar were pinned right sides together using the same method. Then, the two pieces were sewn together using a machine straight stitch, leaving an opening for turning. On Dress A, this was the entire neckline edge, while on Dress B this opening was only about four inches wide on the neckline side. In both cases the corners were dealt with by dropping the needle into the machine and pivoting. These corners were clipped before turning in the same manner and the same point turner tool was used to poke out the corners. Finally, they were pressed using the same electric iron, point presser, and ironing pad. Based on the *Step and Sub-step* columns there was no evidence of a difference in skills or knowledge, tacit or explicit, needed to assemble the collars.

In contrast, looking at the sub-steps required to construct the sleeves reveals a difference in both number and variety of steps. Dress A requires eleven different steps, while Dress B only needs five. There are two reasons for this difference. First, the pattern for Dress B is simplified. It requires only one seam to sew, whereas Dress B needs two. Additionally, the sleeve hem and placket on Dress B are finished simultaneously, in a two-step process. This simplification at the patterning and design stage is seen throughout the construction of Dress B, but best illustrated by this sleeve comparison. The process of finishing the bottom of the sleeve on Dress A is much more complicated, even before the additional step of attaching the cuff. Second, the seams on Dress B are left unfinished, while Dress A uses two different hand finishes. In addition to adding three different steps (finishing the long seam, short seam, and armhole seam) this also brings to attention the significantly higher use of hand sewing required by Dress A. Both Dress A and B have four machine sewn steps. In contrast, Dress A requires seven hand sewing steps to Dress B's single hand sewn step. So, the *step* and *sub-step* columns do suggest a significant difference in the skills and tacit knowledge needed to assemble the sleeves. However, on their own these two columns only point to the possible existence of a difference in required sewing skills. They do not prove it.

Table 9: Sleeve Step Comparison

Dress A Sleeves		Dress B Sleeves	
Ease stitch sleeve cap	Machine	Ease stitch sleeve cap	Machine
Sew long seam	Machine	Sew bias piping to cuff	Machine
Turn and stitch to finish long seam edges	Hand	Secure inner edge of bias piping	Hand
Sew short seam	Machine	Sew long seam	Machine
Finish short seam edge (overcast)	Hand	Attach to bodice	Machine
Finish top placket (turn and stitch)	Hand		
Finish lower placket (bias facing)	Hand		
Hem top edge	Hand		
Attach cuff	Hand		
Attach to underbodice	Machine		
Finish armhole seam (overcast)	Hand		

Cues and Expectancies

If all were going well, the cue for the next action (discussed more in the next section) to begin was the completion of the previous action. Reaching the end of the seam was the cue to backstitch. Finishing the last sub-step in applying the collar was the cue to check the order of operations to find out what section of the dress to work on next. The primary exception to this was when something had gone wrong. An unbalanced seam was a cue to rethread the sewing machine. A piece sewn on incorrectly was the cue to rip the just-sewn seam out. There was also an expectation that all the pieces needed were properly cut out and all the needed supplies were on hand. If this expectation was not met, then it was a cue to rectify the situation in whatever way necessary before moving forward. For example, when finishing the edges of the sleeve placket on Dress A, I realized I did not have a piece of bias tape cut. So, I was cued to find my leftover yardage and go through the steps needed to cut out the appropriate amount of bias tape. This

pointed to the existence of a second "shadow step" within all steps: inspection. While it was not captured directly in the Task Decomposition Worksheet, it was clear upon reflection that before considering a step complete there was always a moment where the work was checked for flaws or mistakes. This was true for both Dress A and Dress B.

Additionally, there were other cues and expectancies experienced in the original production not captured here. If my theory that both dresses were made in professional shops was correct, then multiple seamstresses would have worked on each dress. The cue for beginning a new step may have been being handed the appropriate pieces from the last seamstress to work on them. Additionally, some cues from Dress A would have been based on information gained at fittings. The tucks at the shoulders of the underbodice and the length of the skirt would have been determined by how the dress fit the client. Aesthetic changes to Dress A may also have been determined during such visits. The way the cuffs were sewn on - over an existing hem - suggested that they may not have been part of the original plan. The flap below the waist band may also have been a later addition. The use of patched fabric on the reverse side could have been an indication that it was cut from leftovers after the rest of the dress pieces had been cut. So, while the pattern of cues and expectancies observed during the sewing process did not change from Dress A to Dress B, it was likely that this column provided only a limited view of how cues and expectancies were experienced by the original seamstresses.

Decision

In most cases, the primary decision that needed to be made was whether to proceed. If the previous *sub-step* or *action* was completed satisfactorily then the sewing could proceed. Once a course of action was decided upon, the number of decisions needed was limited. For example, the sash on Dress A was finished with a catchstitch. The original sample determined this action, and it was written into the order of operations created in the previous phase. The individual actions needed to complete each sub-step were part of the seamstress's internal knowledge bank. Throughout the sewing process, the only remaining decision to be made was "am I ready for the next step?" The answer was nearly always yes.

The second most common type of decision that was made centered on the direction and arrangement of sewing. This related strongly to the *Likely Errors and Consequences* and *Potential to Correct Errors* columns discussed in more detail in a later section. When sewing on a machine or by hand, which piece was on top and which direction it started from made a difference in the outcome. On the machine, the bottom fabric often moved a little faster than the top. The reverse was true when hand sewing, especially if the fabric was draped over the hand. This arrangement made it easier to take very small stitches (useful when doing a catch stitch or slip stitch), but also caused the top fabric to come up short. Pinning helped to ameliorate this effect if both pieces were cut accurately, but it was not always a perfect solution. More often, I used this effect to

correct small errors in cutting. Depending on the length of the seam, ¼" to 1" was eased in by taking advantage of this tendency.

Additionally, sewing typically needed to begin at the point with the smallest margin of error. When sewing the side seams on Dress B, I chose to start at the upper end and sew to the bottom. It was more important to preserve the curve of the armhole then have a perfect finish at the hem. Any difference in length between the front and back pieces after sewing was hidden within the hem allowance.

Like the inspection step, this mental process was not noticed right away. It took until nearly the end of sewing on the first finished garment. This was likely because, by that point in the process, so many repeated tasks and sequences (discussed below) had been identified. While I did have memories of being taught directional sewing in school, the ability to apply the principles consistently without significant conscious effort was an example of tacit knowledge. So, while there was no significant difference in the decisions made between Dress A and Dress B, there was a deepening of the information gathered throughout the process that eventually uncovered examples of tacit knowledge.

Action/Response

The *Action/Response* column represents a further breakdown of the information captured within the *Step* and *Substep* columns, as influenced by the *Cues and Expectancies* and *Decision* columns. Table 9 shows an example of the granularity of a

typical entry into the *Action/Response* column. While entries in the *Step* and *Sub-step* columns repeat several times in a row before the *Step* or *Sub-step i*s completed, the same exact *Action/Response* entry rarely occurs twice in a row. Like *Step* and *Sub-step,* the line between two actions is somewhat subjective. For this project, an *Action* is defined as one movement or set of simultaneous or connected movements.

While the entries in the *Step* and *Sub-step* columns were dictated by the order of operations developed in the previous phase, the entries in the *Action/Response* column were identified in the current phase. By looking at data in the *Action/Response* column, most *Sub-steps* were revealed as having three distinct sub-steps: preparation, execution, finishing. For example, sewing a snap on Dress A consisted of the following substeps:

- Preparation: Choosing the needle, cutting the thread, threading the needle, knotting the thread, placing the snap on the fabric, and positioning the needle for the first stitch.
- Execution: Pulling the needle up through the fabric and back down again to create the first stitch, sewing a second stitch over that, moving to the next 3 holes then repeating the process, making a knot on the underside of the fabric.
- Finishing: Holding the thread taut, snipping it, checking the snap for hold.

Table 10: Task Decomposition Worksheet - Action/Response Example

Step	Substep	Cues and Expectancies	Decision	Action/ Response	Previously Recorded Sequence or Action	Purpose	Coordination Requirements	Likely Errors and Consequences	Potential to Correct Errors	Other Possible Responses	Critical Values	Performance Level
Skirt	Finish side edges	Previous step complete	Proceed	First whip stitch	N	Start row of whipstitches	Hold fabric taught in left hand (rabbit hold) and needle in right hand. Pick up a few threads from the main section of the garment then through folded over hem edge by no more than 1/16". Pull thread through, but not too tightly	Take too big a stitch through main fabric and create visible stitch	remove and retry (or accept error if within reason)	Na	Na	Rule

This example is typical in that the most numerous and varied actions were in the preparation phase. Breaking each step down into its actions revealed that a large amount of knowledge was required to complete even seemingly simple sub-steps, like sewing on a snap. These hidden steps within steps were the first indicator of the significant tacit knowledge needed to sew both Dress A and Dress B. While seamstresses would have needed to learn these actions when first beginning to sew, it was not a given that all the details would have been explicitly communicated. Some may be learned based on previous experience or by observing others. Upon reflection, my own habit of gently tugging at every snap after finishing it was the direct result of having snaps come loose at inopportune times.

While the seamstress sewing Dress A may have needed to know how to sew a wider variety of hand stitches, there was little difference in the actions needed to sew those stitches. The only difference in the preparation phase between sewing a slip stitch and sewing a catch stitch was the type of needle that would have been selected[3]. Execution phases would have been different, as forming the actual stitches would have required very different ways of manipulating and moving the needle. However, the finishing phases for both stitches would have been identical. So, while at first using a different stitch seemed to be a completely different skill, it was a minor variation of the

[3] Slip stitches are worked most efficiently on a long needle that allows for multiple stitches to be picked up at once. The catch stitch must be sewn one stitch at a time, so a short needle is preferred.

skill set needed for any sort of hand sewing. This means that there was no significant difference in the tacit knowledge and sewing skills required to make the dresses identified within the *Action/Response* column even though Dress A may have required more hand sewing than Dress B. The most interesting part of this column was how these actions combine to form repeated sequences. This was better understood by examining the next column, *Previously Recorded Sequence or Action*.

Previously Recorded Sequence or Action

Throughout the sewing process there were many discrete actions and sequences of actions that were performed multiple times. Backstitching (Table 11) was the first identified. While the critical values changed based on the seam allowance required for each seam, otherwise the actions, coordination, and other chart values were the same each time. Other repeated tasks included cutting the threads after finishing a seam, tying a knot in thread before sewing, and lowering the presser foot before beginning a machine sewn seam.

Table 11: Backstitch Task Decomposition Worksheet

Step	Substep	Cues and Expectancies	Decision	Action/ Response	Previously Recorded Sequence or Action	Purpose	Coordination Requirements	Likely Errors and Consequences	Potential to Correct Errors	Other Possible Responses	Critical Values	Performance Level
Prep-ties	Sew top edge of tie	Fabric is in place a properly aligned, machine is set correctly	Proceed	Backstitch	No	Secure end of seam	Hold reverse button down with right hand. Guide fabric with left hand. Push down on foot pedal with right foot just enough to make 2-4 complete stitches. Release pedal, then reverse button	Reverse button doesn't engage. Take too many stitches backwards and fall off the edge of the fabric, which can cause the thread to tangle and knot.	If the reverse button doesn't engage, lift foot, and try again. Remove stitches if you go more than 5 stitches too far forward. If thread tangles, stop sewing, remove piece from machine, fix machine, remove previous stitches, and try again.	Don't backstitch, instead hand tie knot after seam is complete.	NA	Rule

Repeated sequences were made up of repeated actions. Before sewing the seam, a preparation sequence was required to set up the seam for sewing. This consisted of pinning, when necessary, followed by checking the machine settings (stitch length, needle position, foot type, power switch, threading, bobbin fullness), positioning the fabric under the presser foot, and lowering the presser foot. Sewing a seam was a combination of backstitching, sewing forward, stopping to adjust the fabric (and if necessary, removing pins), then sewing again. This sequence was repeated until the end of the seam was reached; then it was finished by backstitching. Afterward, there was a separate sequence to remove the item from the machine and cut the threads. This was usually followed by a pressing sequence.

Occasionally slight deviations from these established sequences were required. The shoulder tucks on Dress B were a great representation of this. In this case, the end of the seam could not be backstitched without creating an unsightly lump. It was not possible to see how these seams were finished on the original as the reverse side was hidden by a lining, however it was decided that the ends most likely were pulled to the backside and then tied in knots. This alternate sequence was repeated on all nine remaining tucks, forming a new repeated sequence. Knowing when to implement these alternate sequences was a form of tacit knowledge.

The main difference between the two dresses in terms of repeated sequences and actions can be found in the difference between the number of hand stitches used in the

two dresses. Hand stitches, like the running stitch used to finish the interior skirt seams on Dress A, consist of a series of repeated tasks that form a repeated sequence. Some of the actions show up in both Dress A and Dress B. These consist of the beginning and ending steps required to sew the seam, such as threading the needle. The actions required to sew the seam, in contrast, are only taken in Dress A, for example, loading multiple short stitches onto a long needle. So, the running stitch sequence appears only in the making of Dress A, but most of the actions required are already known to the makers of Dress B. It is also possible that the seamstress making Dress B would have learned and used these extra stitches when making other garments. So, based on the information in the *Previously Recorded Sequence or Actions* column, there is no significant difference between Dress A and Dress B.

Purpose

This column captured the reasoning behind the specific action taken in the Action/ Response column. This was in addition to the obvious, which was completing the step or substep. In most cases this was straightforward. A seam was pinned in place before sewing to ensure that the fabric would not shift during sewing. Seams were pressed after sewing to provide a professional finish and to smooth out any wrinkles made during the sewing process. The *Purpose* column answered the question: how will the action you take help to complete the step and sub-step?

One frequent action taken during hand sewing was to hide the knot at the beginning of a seam. While the step or substep was, in most cases, completed without this action, this study revealed it to be a one of my personal ingrained habits and a common habit of the seamstresses I was emulating. There were exceptions to this, the knots in the threads used to hold on snaps were not always hidden. However, the default was to keep them from view. Upon reflection, I was hiding them for three reasons: to protect the wearer from irritation, to protect the knot from abrasion (which can cause it to unknot and the seam to fall out), and an aesthetic preference. This did not change between Dress A and Dress B. Overall, the purpose column revealed little difference between the two dresses, primarily because the actions themselves were not different.

Coordination Requirements

The entries into this column fell into two categories: moving multiple body parts independently and maintaining tension. Both categories leaned heavily into the tacit realm of skills and knowledge. Even when explained explicitly, it was difficult to fully understand without experiencing personally. Additionally, while both categories applied to most steps, they were separate enough skills that it was worthwhile to look at them individually.

Moving multiple body parts independently is a skill that is vital to most sewing operations. It is not unusual when operating the sewing machine to be moving both the

left and right hand independently while controlling the speed with the right foot and stabilizing the body with the left leg. Backstitching is a good example of this, with the left hand controlling the fabric, the right hand holding the reverse button, the right foot controlling the foot pedal, and the left foot stabilizing the body. Sewing a straight seam forward is similar, but usually the right-hand alternates between helping to guide the fabric and removing pins. While it is possible to describe these actions, completing them requires skills that must be acquired through practice.

Hand sewing does not explicitly involve the lower body, but the use of the hands is more complicated. During hand sewing the fingers frequently operate in complex manners, with a single hand sometimes performing multiple functions at once. In most cases, the left hand holds the top of the section of the fabric between the index and middle finger, while the bottom of the working section is held by the ring finger, pinky, and thumb. With my hands, this creates a workable area of about two inches which must be continually adjusted. Those with larger hands would likely have a larger working area, but only by an inch or so. Holding and adjusting with the left hand happens concurrently with any motions necessary to sew the stitches using the right hand. It is also not unusual for the lips to be used to hold objects like pins or for a just threaded needle to be stuck temporarily in the seamstress's own blouse for safe keeping. Adjusting fabric on the worktable has the tendency to make such objects fly about, so simply placing them on the table usually is not a good option.

Coordination was not limited to sewing operations. Pressing also involved a great deal of dexterity. This was particularly relevant when pressing in folds. There was a need for precise control as burning the fabric or the hands manipulating it was a significant concern. So, the iron was held in the right hand while the fabric was manipulated with the left. In several cases, the manipulation required was folding. To fold the fabric in half while ironing, the left thumb was placed inside the fabric (where the fold was desired) while the left fingers guided the fabric.

One of the main reasons why it is necessary for seamstresses to use multiple body parts at once is because many sewing actions rely upon maintaining proper tension in the fabric and thread. When hand sewing, holding the fabric too loosely makes it difficult to sew evenly. At the same time, pulling the thread too tightly distorts the stitches and creates messy seams. When sewing by machine, holding the fabric too tightly can stretch it out, while failing to hold it tightly enough can cause the seam to drift and wiggle. Tension is also important when pressing. In most cases, only a little tension is needed, just enough to avoid accidentally pressing in wrinkles. However, after attaching the underbodice and overbodice to the waist stay, a significant amount of tension is desired while pressing. The petersham waist stay tends to shrink after being sewn, and the only way to get it back to the desired measurement is to pull on it while pressing.

Both dresses A and B relied heavily on both elements of coordination. However, there were two main differences: fabric challenges and variety of hand stitches. Dress A

used more challenging fabrics than Dress B. So, while the actions taken to create a slip stitch hem were the same, the completion of those actions was more difficult and time consuming on Dress A. This, however, cannot be taken as evidence of difference on a wider scale because silk charmeuse was also a common fabric in the 1920s. The increased number of hand stitches showed a difference between the two dresses when looked at through the lens of the *Coordination Requirements* category. While the *Actions* column showed that most actions (and therefore coordination requirements) were the same regardless of the type of hand stitch used, the coordination skills were significantly different between stitches. So, while there was not a significant difference in the intellectual act of sewing different types of stitches, the physical actions required different tacit knowledge and skills. This means that, overall, there was a small difference in coordination requirements between Dress A and Dress B.

Likely Errors and Consequences

The ability to predict the things that could go wrong was a surprisingly important tacit behavior that went on throughout the entire sewing process. Predicting the behavior of materials and tools required combining past experiences with observed behaviors and physical sensations, some of which were obvious and others which were less so. For example, turning the bias-cut tubes for the loops in Dress B required the ability to manipulate both a narrowly sewn piece of bias-cut fabric and the ability to use a loop

turner[4]. The bias-cut tubes stretch in a way that was completely different from fabric cut on the strait of grain or a similar shape of knitted material. The small size and presence of stretch often caused these tubes to become stuck during the turning process. Sometimes, all the seamstress needed to do was keep pulling, and the tube finished turning. Other times, continuing to pull just made the stuck point worse. Eventually, pulling caused the loop tuner to pull free from the tube, leaving it stuck halfway. However, there was a big risk of the loop turner coming loose if the seamstress stopped to massage out the stuck point. The ability to know when to keep pulling and when to stop and massage the turning point was learned through experience and is difficult to communicate.

Entries in the *Likely Errors and Consequences* column also involved understanding how those errors might impact the sewing process several steps down the line. This often was closely related to coordination requirements, as shifting and stretching fabric were common causes of errors. Both dresses employed bias strips to finish edges. While cutting fabric like this had advantages, such as allowing for smooth sewing around curves, it also had downsides. The bias-cut strips stretched easily and

[4] It is unclear if the loop-turner as used in this project was available during the 1920s. The earliest relevant patent I was able to locate was filed in 1952 and issued a few years later (Fraser, 1955). It is not clear if this patent represents the first iteration of this tool or built upon an existing idea. However, alternative methods of turning loops, such as the sewing needle method described in *Decorative Stitches and Trimmings* (1929), would have required similar coordination skills and had similar likely errors during the turning process.

shrunk in width when stretched. This could lead to numerous problems. Avoiding these errors required coordination and foresight.

Also important to this column was my own internal library of previous sewing errors that developed over decades of sewing. Having sewn sleeves on backwards once when I was learning to sew, I have since always triple checked my accuracy before sewing. Knowing that the consequences of that error were too big to ignore and time consuming to correct, I always took extra care at that step.

Potential to Correct Errors

While there is a wide variety of different possible errors, once made, correcting those errors falls into one of two categories: high-cost and low-cost. Low-cost errors, such as a misplaced pin or fabric shifting as the presser foot is lowered, can be corrected by reversing the action and attempting it again. Failure to correct these low-cost errors can have significant impact a few steps later if they go unnoticed, for example, if the misaligned fabric isn't repositioned before the seam is sewn. However, low-cost errors can be corrected with no damage to the fabric and little effort if caught before the next step progresses. Knowing the difference between the two is a vital form of tacit knowledge.

In contrast, high-cost errors require significantly more work to correct. Often this means that several steps will have to be repeated, going as far back at times as the cutting

out of pattern pieces. Best case, the stitches can be removed quickly and without damaging the fabric and only a few steps, such as positioning the fabric under the machine, will need to be repeated. In a worst case, such as on the jetted pockets of Dress B, the cost of cutting too far into the corner after sewing the parts of the jetted pocket in place is very high. Cutting too far means that the corner of the pocket will fray. This error cannot be fixed and so the front section must be discarded. The front then would need to be re-cut, as well as the pocket bags and the bias for the piping (if no extras remain). All previously completed steps on the upper-front piece would need to be repeated.

The tool used usually determines the severity of potential damage and thus the ability to correct it. Overall, seams sewn by machine are more likely to result in a total loss. The silk charmeuse of Dress A is much more easily damaged and likely to need to be discarded. However, Dress B employs more machine sewing and more regular seam allowances. The silk fabric used in Dress A is also less prone to damage from the iron than the rayon used in Dress B. Silk is capable of withstanding higher temperatures than rayon, so a slight pause in the movement of the iron or an incorrect temperature setting is less likely to result in permanent damage to the fabric. Therefore, Dress A appears to be more tolerant of error.

This category also related to another judgement call: acceptable margin of error. One of the main ways that my sewing differed from that of the original seamstresses was

that I operated with a completely different view of acceptable versus not acceptable errors. Whenever I made a mistake, I asked myself four questions, in order of importance:

1. Will this make future steps harder or impossible?
2. Can I learn anything from ripping this out and doing it again?
3. Will I damage the fabric if I take this out?
4. Will this be visible in the finished dress?

For example, when stitching the snaps onto the sleeves of Dress A, I made several small errors. When the error involved snap placement, the snaps were removed and resewn. The placement was off enough that the placket would not have closed properly, failing questions (1) and (4). This outweighed the lack of new knowledge from repeating the task (2) and the risk of damage (3). However, where snaps were sewn on in the correct position, but a few stray stitches were visible out the outside of the fabric, the snaps were left in place. These stray stitches did not impact future work (1). Taking them out would not provide any significant new knowledge (2) because several snaps had to be sewn on, building in repetition. There was some concern about damage (3), because the thin silk fabric was prone two showing old needle holes. Finally, the errant stitches were not a major distraction from the finished project, as they could only be seen from certain angles under close inspection (4). If used as a teaching tool, the presence of errors like this might even be a way to spark conversation about the sewing process and sewing skills.

However, the makers of both Dress A and Dress B would have used entirely different rubrics for determining acceptable quality. As determined in the earlier chapters, the dresses were most likely made by professional seamstresses in professional settings. This means that the difference between good-enough and unacceptable would have included both their own judgments and those of other stakeholders. Dress A would have been judged by the head of the dressmaking shop. Continued employment would have depended on sewing at a level acceptable to the employer. This dress would have been worked on by multiple seamstresses, each one judging the work of the others. Junior seamstresses would have learned about acceptable quality by observing the work of senior seamstresses. Those same senior seamstresses may have been responsible for directly judging the work of the junior seamstresses. Last, the client would have needed to find the quality of work acceptable.

A final element that both the makers of Dress A and Dress B would have had to consider was the norms for acceptable quality at the time of construction. Dress B closely resembled modern ready-to-wear in its construction. The pieces were all pre-planned and the overall piece was simplified. It was around the time that Dress B was made that the perceived quality of homemade versus ready-to-wear clothing switched places (Connolly, 1999). The work of professional factory seamstresses was perceived as higher quality, and so both the customers and the supervisors would be looking for nicely matched seams and professional finishes. Except for the back of the neck, everything in

Dress B was nicely finished and sewn in the original. Furthermore, producing a dress in multiples would have meant that there was less room to correct errors. When all the dresses needed to look the same, there was no way to work around flaws.

In contrast, the construction of Dress A is improvisational, including finishing and sewing. The dress pieces are assembled in such a way that the fit and style can be adjusted on the fly, without the expectation that all seams will be perfectly finished on the interior. This effect is seen most notably at the waist. The upper flap, lower flap, and skirt are all finished at the waist opening by facings made from small pieces of fabric, likely scraps. During the patterning and construction process I theorize that cutting these out of scraps, as needed, would be the most efficient way of producing these facings, and in the end this proves true. The resulting edges are finished, but in a way that would not be acceptable to modern consumers. However, it appears to have been acceptable practice. External appearance and function are the priorities for the seamstress working on Dress A, internal appearance is not. So, *Potential to Correct Errors* reveals that both seamstresses would have relied on their own, internal library to judge quality. However, the seamstresses making Dress A and Dress B would have been operating according to significantly different standards and audiences.

Other Possible Responses

The value in this column came from the way it unearthed the rejected options available in any given step. In some cases, these alternate options were rejected because they were not in line with the samples being reproduced. The other options were not necessarily wrong, just not what was done on the sample. Other times, the alternate options had been rejected during the experimentation process. Like the previous columns *Likely Errors and Consequences* and *Potential to Correct Errors*, this column relied heavily on the seamstresses' past experiences and knowledge. No difference between Dress A and Dress B was evident in this column.

Critical Values

In most cases, there were no critical values to report. When they were present, they consisted of machine settings and seam allowance. While these fixed numbers at first appeared to be straightforward, hidden within was a piece of tacit knowledge: error tolerance. The logic behind these was largely the same as explored above in *Likely Errors and Consequences.* Within *Critical Values* error tolerance was most commonly an issue where seam allowance was involved. The 3/8" seam allowance used in most of Dress B required a much smaller margin of error then the more generous ½" seam allowances found throughout most of Dress A. The difference in acceptable vs not acceptable was small, but real. Additionally, it was relevant that both Dresses would be less dependent on exact seam allowances than those made in the late 19th century. Both bodices were

loose fitting and consisted of fewer pieces than was common before. Even with a consistent sewing error of 1/8" both dresses would still fit their intended wearer. In contrast, a tightly fitted multi-panel 19th century bodice might have ended up significantly larger or smaller with such a large seam allowance variation.

There also is additional knowledge within other sewing machine adjustments. Stitch length can be set by someone who does not fully understand the setting, but there are still reasons behind it. While the exact critical values used in the two dresses are not identical, the types of values and the reasoning behind them are the same.

Performance Level

It could be argued that many of the steps taken during the sewing process would be considered to fall into the "skill" category because they are simple, repeated tasks. However, the act of filling out the whole task decomposition worksheet reveals that this is generally a false assumption. The *Likely Errors and Consequences*, *Potential to Correct Errors*, and *Other Possible Responses* columns all show that there is more than just mechanical adherence to prescribed steps occurring. For example, the decision to remove a pin while sewing is based on balancing the risk of fabric shifting with the potential damage caused by breaking a needle on the pin. The decision to remove the pin is based on a heuristic that pins should be removed whenever possible. In some cases, the seamstress may decide to risk breaking a needle if the risk of shifting fabric is

considered unacceptable. The existence of this sort of reasoning rules out "skill" as an option for most actions.

Additionally, few of the actions taken by the seamstress qualify as "knowledge" based. Knowledge based actions are taken in response to "problems for which there is no obvious response" (Caird-Daley et al., 2013, p. 2). However, in most cases the problems solved during the sewing process have clear goals and limited possible solutions. Knowledge level actions are much more likely to occur in the design phase, which is outside the scope of this project.

This left "rule" as the only logical performance level to assign to most of the actions taken by seamstresses. The seamstress was presented with a problem and needed to use previous knowledge to find the best possible answer. The possible answers were not unlimited because there was a defined goal in place, creating a wearable garment. The parameters of that garment had already been determined by the designer or dressmaker. The seamstress was also working within the boundaries created by available materials and how they functioned. While previous columns revealed that Dress A had slightly more improvisation in its creation, overall no significant difference was found between Dress A and Dress B regarding the performance level column.

Conclusion

This chapter explored findings and insights from analyzing the entries in the *Task Decomposition Worksheet* made during the sewing of the final replica of Dress A and Dress B. Looked at from the *Step* and *Sub-step* levels, the dresses were difficult to compare. However, breaking the sewing down in this way revealed two direct opportunities for comparison (the sleeves and the collars) which shows how much more complex the construction of Dress A was than Dress B. However, the findings in this chapter also show a significant similarity in the skills and tacit knowledge needed to sew both dresses when explored at the level of *Action/Response.* At this level, the primary difference laid in the *Coordination Requirements* relates to hand sewing. Additionally, analysis of the worksheet illuminates some areas of information that were not explicitly captured by it, for example, how the margin of error and acceptable standards of quality would have been affected by the environment the seamstress was working in. Finally, the worksheet made it possible to uncover areas of tacit knowledge present within the sewing process.

Chapter 8: Conclusion

The purpose of this study was to understand how the sewing skills and tacit knowledge required by seamstresses changed in the early part of the twentieth century. I was specifically interested in studying women's dresses made in 1910 and 1920 because that was the point in time when consumers completed their transition away from patronizing custom dressmakers and to buying ready-to-wear clothing. Additionally, this study sought to create a formalized and reproducible method for studying historic garments through making. This study began with the visual analysis of ten dresses dating from 1910 to 1929. This was followed by a series of experiments to better understand the construction of two chosen dresses (A and B) and then finally, by the reproduction of Dress A and Dress B, the processes of which were documented using a variation of the Task Decomposition Framework.

This chapter summarizes these findings and discusses the themes revealed during this process. This chapter concludes with a discussion of the significance and limitations of this study and avenues for possible future research.

Summary

This study aimed to uncover any change in the sewing skills and tacit knowledge necessary to sew dresses between the 1910s and the 1920s. To accomplish this, first the physical characteristics of ten dresses were recorded and compared. Five of these dresses

were identified as produced in the 1910s, while the other five were made in the 1920s. These were compared based on four primary areas: style, fabric, construction, and additional materials. This comparison established that the two primary dresses, Dress A (1910s) and Dress B (1920s), were both typical examples of their respective decades. Second, a series of experiments were conducted to understand the construction of Dress A and Dress B. This included creating patterns, testing those patterns by creating toiles using a stable test fabric, and testing sewing techniques on fabric similar to the original garments. The information gained during this experimentation was then analyzed based on the Severa Horswill (1989) method using four different lenses: Identification, evaluation, cultural analysis, and interpretation and intuitive analysis. Last, reproductions of the two primary dresses were sewn while the sewing actions were simultaneously recorded using the Task Decomposition Worksheet. The findings from each of the columns in this worksheet were then analyzed and discussed.

Conclusions Related to the Research Question

First, it was established that Dress A and Dress B were constructed in a manner typical to their respective decades. Additionally, analysis of the ten sample dresses revealed that there was a significant reduction in the inner structure, number of fabrics used, amount of hand sewing, and complexity of openings from the 1910s to the 1920s. This change in what constituted acceptable construction quality in garments and standard

construction practice pointed to a change in the skills and tacit knowledge needed to sew those garments.

Next, the experiment phase showed that Dress A used more varied techniques and was more complicated in construction than Dress B. The construction of the dresses also strongly implied a difference in the working conditions in which the dresses were constructed. This difference is made visible in the fluid and improvisational assembly of Dress A when compared to the linear and inflexible nature of assembly required by Dress B. This difference would have had an impact on how many seamstresses worked on each dress and the type of stress the seamstresses were under. However, many of the differences between the two dresses would have been the domain of higher-level individuals, such as designers or dressmakers, and would not have influenced the seamstresses' work.

Finally, analysis of the Task Decomposition Worksheet showed that the overall construction of Dress A was more complex and that a wider variety of skills were used. However, this chapter also revealed that on a micro-level, the skills and knowledge needed were not as disparate as they first appeared. The *Coordination Requirements* column in particular showed that the ability to complete most tasks was highly dependent on seamstresses' ability to control the tension in the materials, which was largely tacit knowledge. Once learned, this basic tacit knowledge could be applied or adapted to numerous other tasks. So, while there are differences in the design and construction of

clothing from the 1910s to the 1920s, the tacit knowledge and sewing skills used to make them are very similar. A seamstress trained in one decade would not need significant re-training. Based on my analysis of these two dresses, de-skilling of seamstresses was present between 1910 and 1920. This consisted of a reduction in the types of hand stitches used and an overall simplification of garment construction. However, this was overall minor and likely not uniform across all seamstresses or workshops. Additionally, most of these changes were present in the form of explicit rather than tacit knowledge.

Conclusions Related to the Methods

The basic framework of the method used in this study (observation of multiple garments, experimentation, and then full recreation) is sound. Findings that might otherwise have felt subjective are reproduced multiple times during this three-step process, ensuring that the resulting findings are valid. Additionally, the repetition allowed for an increased deepening of understanding, as suggested by the excavation model described in the Methods chapter.

The Severa Horswill (1989) method of material culture analysis, which provided the basis for the analysis of the comparison and experiment phases of this study was successful at providing a good structure for a comparative material culture analysis of dress objects. By first determining the modal types of the dresses, I was able to validate my choice of primary subjects and prove that findings from the later phases could be

generalized to include other dresses created during the period of study. The experiments performed in Phase 3 allowed me to better understand the construction of the dresses, in ways that could not be fully appreciated through observation alone, uncovering part of the tacit knowledge that existed within the garments. I was then able to work through the categories of identification, evaluation, cultural analysis, and interpretation as a way to externalize this new level of knowledge. The material culture framework enabled me to think through all relevant facets that would have affected the makers of the original dresses and express those findings in a format that has a longstanding acceptance by those studying dress.

The process of completing the Task Decomposition Worksheet as used in the Reproduction phase was both time consuming and mentally taxing. However, it had the significant benefit of simultaneously recording and coding the information gathered. Additionally, analysis using this framework made it possible to uncover instances of tacit knowledge in a way not possible through material culture analysis alone. This was true both because it provided an additional opportunity for reflection and because the framework recorded both movement and though process simultaneously.

Significance of the Study

This study is significant because it demonstrates that the skills and knowledge needed to sew clothing changed very little, even as the way clothing was produced and

sold changed significantly. It shows that once basic sewing skills are mastered, adding additional techniques is a relatively minor matter. It suggests that most seamstresses in the 1910s and 1920s would have had little trouble making the transition from one garment production style to the other.

Additionally, this study is significant because of the way it attempts to create a formalized, triangulated, and reproducible method for studying dress through making. Though much good work has been done in this field, the lack of defined method has been a persistent hindrance both to the process of research and the acceptance of that research as valid. One important element of this was the inclusion of tacit knowledge as an element of material culture. By combining the two, this method opens up new avenues of inquiry and provides a new way of approaching material culture studies. Furthermore, while the paper that introduced me to this method found the task decomposition process to be too time consuming for use in artificial intelligence research (Caird-Daley et al., 2013), the process has proven to be a valuable way to uncover the physical and mental skills necessary to sew garments. While the method developed here is not by any means the perfect or only way to study dress through making, it does provide something valuable for future researchers: a jumping off point. If I had the luxury of having someone else's method to start from, this project would have taken significantly less time and gone much more smoothly.

Limitations of the Study

Before completing this study, two primary limitations were identified: a small sample size and a lack of existing knowledge regarding the specific samples chosen. The latter makes it difficult to generalize and contextualize the findings in a concrete manner. This was somewhat ameliorated by the comparisons done in the first phase of the study, which strongly support the assertion that the two dresses chosen for this study were representative of their time periods. Additionally, this limitation is not unique to this study. Dress collections have been known for having little provenance attached to the garments contained within due to a wide variety of factors. However, additional contextual information would allow for a stronger and more specific case to be made regarding the skills and knowledge needed by the seamstresses who worked on the focus dresses.

The former issue, that of sample size, is common when researching any physical object at the level of detail done in this study. As this relates to the number of objects studied, this is remediated somewhat by conducting an observational study on multiple garments in the first phase before moving on to phases of the project that require more time-consuming, hands-on work. However, the sample size of the seamstress does remain. As a single seamstress/researcher, biases and gaps in knowledge inevitably have an impact on this study in ways that are difficult to fully know. Additionally, the physical reality of my own body may have impacted the results. This manifested in

several ways. I primarily function as a right-handed person, but as a child I was ambidextrous. So, I have more control over my left hand than others might. I also am nearsighted and developed a need for reading glasses over the last few years. However, I was able to easily acquire appropriate corrective lenses for both issues. A seamstress with less reliable eyes may have to rely more on touch than I did.

One additional limitation of the study was the specific focus on seamstresses, rather than dressmakers or designers. Many of the differences found between Dress A and Dress B would have been the domain of those higher up the hierarchy in the dressmaker's workshop or a clothing factory. These changes may not have impacted a seamstress who was content to work as a seamstress for the duration of her career. However, these changes could have impacted a seamstress who wanted to move into work as a dressmaker or designer.

Directions for Future Research

There are many possible avenues for further research related to the concepts of sewing skills and the research method itself. Ultimately, I would love to complete similar studies on garments spanning from just before the invention of the power loom through to the present. This would allow me to track the changes in sewing skills and norms through several major shifts in clothing construction and consumption. While only minor changes in skills were seen from the 1910s to the 1920s, it is reasonable to assume a

longer timeline would show more significant shifts. Perhaps even uncover areas of lost skills and knowledge. Though I admit that the work alone could take a lifetime to complete and the free access to garments that I enjoyed at GMD would be increasingly limited as the garments became older.

This process would also benefit from being repeated on garments that have a more established provenance. This would allow for an additional check against information uncovered during the sewing processes, making the data even more reliable. It also would provide added information as to the nature of the shop in which the garments were constructed. Ideally, I would start with a dress from a dressmaker or designer with a well-documented shop.

Before starting a similar investigation, I would also like to develop a reflective journaling framework to replace the Task Decomposition Worksheet. I believe that this would increase the speed at which a project like this could be completed without negatively impacting the outcome. After completing this project, I believe that the Task Decomposition Worksheet is a valuable tool for training the mind to deconstruct tasks, but ultimately an inefficient tool for gathering data. The other tools developed during this process could also benefit from refining. The study of clothing by reproduction is experiencing an increase in interest right now, particularly in the United Kingdom. Before starting any new projects, it would be vital to see what tools and procedures had been developed since this project began and integrate those lessons into my own work.

Additionally, there are several avenues of research to explore that would require the participation of others. To start, I would be very interested to see the conclusions reached by comparing the results of two or more different seamstresses. This would be more achievable than I previously thought when using a journaling model as mentioned above. It also would be fascinating to recreate not just a dress, but an entire dressmaker's workroom to analyze the skill use and processes more deeply. Again, I acknowledge that these proposed projects are large and complex, and so would require resources that I do not currently possess. However, it would be a great pleasure to see them completed.

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Appendix A: Research sample

All professional images courtesy of the Goldstein Museum of Design.

Group	Number	Nickname	Image
P	1996.146.004	Dress A	
A	1963.004.026	Burgundy Brodeen	

A	1964.009.001	Pink McGahn	
A	1984.036.004	Blue English	

A	1997.043.012	Pink Benston	
A	CX-00147	Black Boyd	

P	1992.004.002	Dress B	
B	1964.015.009	Blue Hollander	

B	1965.008.002	Peach Bjorkman	
B	1996.108.014	Pink Castel	

B	1982.029.005a-b	Blue Belted	
B	1997.037.002	Blue Swirls	

Appendix B: Sample Observation and Reflection Worksheet

Photographs

General

What type of garment is it?	
Is the garment intended for:	Male - Female - Unisex
Is the garment intended for:	Adult - Teen - Child - Infant
Are there any labels on this garment? (take photographs and note locations)	
What are the dominant colors and/or patterns of the garment?	
What are the main fabrics that have been used to make this garment?	
Are these fabrics predominantly natural in composition or man-made? (How do you know?)	

What decade or general period was this object made in? (How do you know?)	
Can the garment be handled safely without causing further damage?	
What are the most unusual or unique aspects of the garment?	
Does the collection have any other garments like it, either by the same designer or from the same period?	

Construction

Describe the main components of the garment, such as bodice, collar, sleeves, skirt, etc...	
Does the structure of the garment emphasize one part of the body?	
Is the garment machine-stitched, hand-made or a combination of these methods? Look at Hem, Side Seam, and Armhole in particular	

How is the garment closed or fastened?	
Are there any front, side, flap, or hidden pockets?	
Are there any remarkable features in the construction, such as a bias cut or use of nontraditional materials or structural elements?	
Is the fabric selvedge visible in the seams, and has this been incorporated into the cutting or construction of the garment?	
Is the garment reinforced in any way, such as padding, boning, metal hoops, or wire reinforcements?	
Is the garment lined?	

Textile

What is the dominant textile or material that has been used?	

Has the dominant textile been subjected to a finishing process, such as bleaching, pressing, or glazing?	
Have any other textiles been used in the garment or the lining?	
Does the garment incorporate a stripe or pattern? Is it woven into the fabric or printed or formed by a different method such as stenciling, painting, or manipulation of fabric?	
Is there any form of applied decoration such as applique, trim, lace beading, embroidery, buttons, ruffles, pleated bands, or bows? Are there signs that any such decoration has been removed?	
Has the fabric been reinforced in any way with padding, quilting, interfacing, wires, or boning?	
Hs the textile faded or otherwise changed in color?	

Labels

Is there a maker label?	
Is there a store label to identify where the garment was purchased?	
Are there any care labels?	
Are there any size labels?	
Is there marking inside that indicates the specific owner of the garment?	

Use, Alteration, and Wear

Has the garment been structurally altered in any way?	
Where does the garment show wear?	
Is the garment soiled or damaged in any way?	
Has the garment been dyed to alter its original color?	

Have any trims or embellishments been removed?	
Does the styling of the garment conform to the predominantly fashion of the period, or does it represent a hybrid, perhaps custom-made for the owner?	

Supporting Material

Does the collection have any provenance records associated with the garment?	
Are there any photographs of this garment?	
Are there any further documents or information about the garment that might indicate the original price of the garment?	
Are there any manufacturer, store tags, original packaging associated with this garment?	
Are there any similar garments by the same designer, or by other designers from the same period, in this collection?	

Sensory Reactions

Sight: Does the garment have stylistic, religious, artistic, or iconic references?	
Sight: Is the garment stylistically consistent with the period from which it came from? Does it seem to reflect the influences of that period or diverge from it?	
Touch: What is the texture and weight of the cloth or other materials used to construct the garment?	
Sound: Would a person wearing this garment make noise?	
Smell: Does the garment have a smell?	

Personal Reactions

What was in impetus to examine this garment? Were you interested in the person who wore it, the maker, or some other aspect of its object biography?	

Are you the same gender and size was the person who wore or owned the garment? Did a person who was bigger or smaller than you wear it? Would the garment fit your body?	
How would it feel on your body? Would it be tight or loose? Would the garment cause discomfort or pain?	
Would you wear this garment if you could?	
It the style and color appealing to you?	
Does the garment demonstrate a complexity of construction or element of mastery in the design?	
Did the maker want to invoke emotion, status, sexuality, or gender roles with the garment?	
Do you have an emotional reaction to the garment? Can you identify a personal bias that should be acknowledged in your research?	

Contextual Information

If you were permitted access to the provenance record for the artifact, what does this information reveal about the owner, and their relationship to the garment?	
Does the museum, study, or private collection have other garments that are similar, or by the same designer/maker?	
Do other museums have similar objects? Can you identify similar objects in online collections of dress?	
Have other scholars written about this type of garment of the designer's work in books or peer-reviewed journals?	
Are there similar garments or related ephemera (advertisements, fashion photographs, packaging, and other print material) available for sale on Etsy, eBay, online vintage retailers, or on auction sites?	

Are there photographs, painting, or illustrations of this garment, or of similar garments in books, magazines, museum collections, or online?	
Has this garment, or others like it, been referenced in documents, such as letters or receipts, or magazines, novels, and other forms of written material?	
If the maker of the garment is a known designer, what information is available about them? How does this garment fit into their oeuvre? ect...	

Appendix C: Pattern Record Cards

Style - Dress A

SIZE RANGE

YARDAGE

DATE 10/15/2019

PATTERN PEICES		SELF
1.B	Skirt Side Front - Cut 2	
1.C	Skirt Back - Cut 2	
1.D	Skirt Flap - Cut 2	
2.A	Sash Waist - Cut 1	
2.C	Sash Short - Cut 1	
2.D	Sash Long - Cut 1	
3.A	Bodice Bib - Cut 1	
3.B	Bodie Side Front - Cut 2	
3.C	Bodice Collar - Cut 1 on fold	
3.D	Bodice Extender - Cut 1	
3.E	Bodice Back - Cut 1 on fold	
4.A	Sleeve - Cut 2	
4.B	Cuff - Cut 2	
5.C	Underbodice Sleeve Facing Front - Cut 2	
5.D	Underbodice Sleeve Facing Back - Cut 2	
	CONTRAST 1	
1.A	Skirt Center Front - Cut 1 on fold	
	CONTRAST 2	
2.B	Sash Waist Front Contrast - Cut 1	
2.C	Sash Short - Cut 1	
2.D	Sash Long - Cut 1	
3.C	Bodice Collar - Cut 1 on fold	
4.B	Cuff - Cut 2	
	LINING	
5.A	Underbodice Front - Cut 2	
5.B	Underbodice Back - Cut 1 on fold	

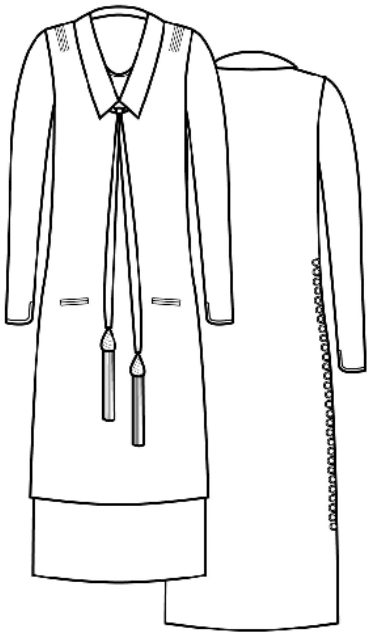
BUTTONS - 1/2 inch covered 22
BUTTONS - 5/8 inch covered 12
SNAPS - 23 small
HOOKS AND EYES - 2 large
HOOKS AND EYES - 5 small
RIBBON - 2 inch wide 29 inch long grosgrain
LACE - 1/4' inch wide 28 inch long
OUTSIDE WORK
Cover buttons
Piping

Style - Dress B

SIZE RANGE

YARDAGE

DATE 10/08/2019



PATTERN PEICES	SELF
1 Front - Cut 1 on fold	
2 Lower front skirt - Cut 1 on fold	
3 Collar - Cut 1 on fold	
4 Sleeves - Cut 2	
5 Back - Cut 1 on fold	
6 Pocket front - Cut 2	
7 Bocket Back - Cut 2	
8 Ties - Cut 2	
	LINING
9 Front underlining - Cut 1 on fold	

SNAPS - 2 Small

BUTTONS - 60 1/2inch Covered

TASSLES - 2

CORD - for loops and binding

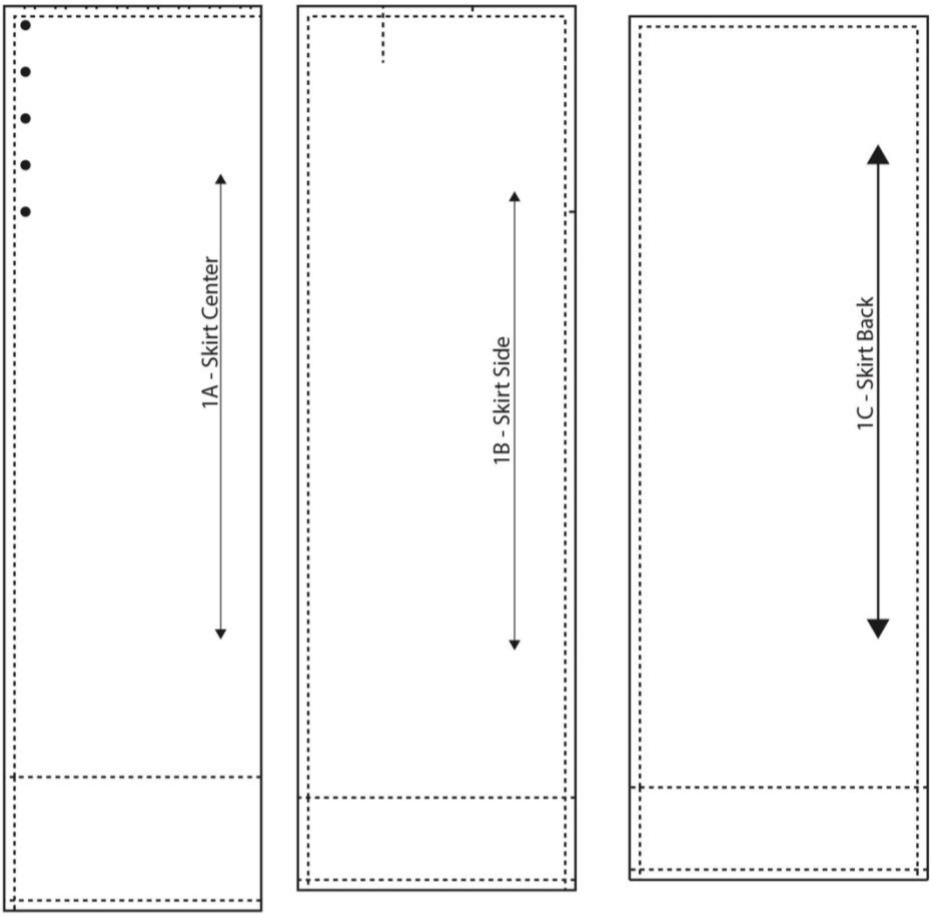
OUTSIDE WORK

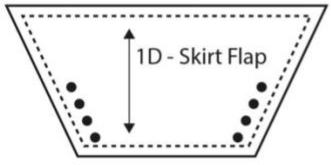
Cover buttons

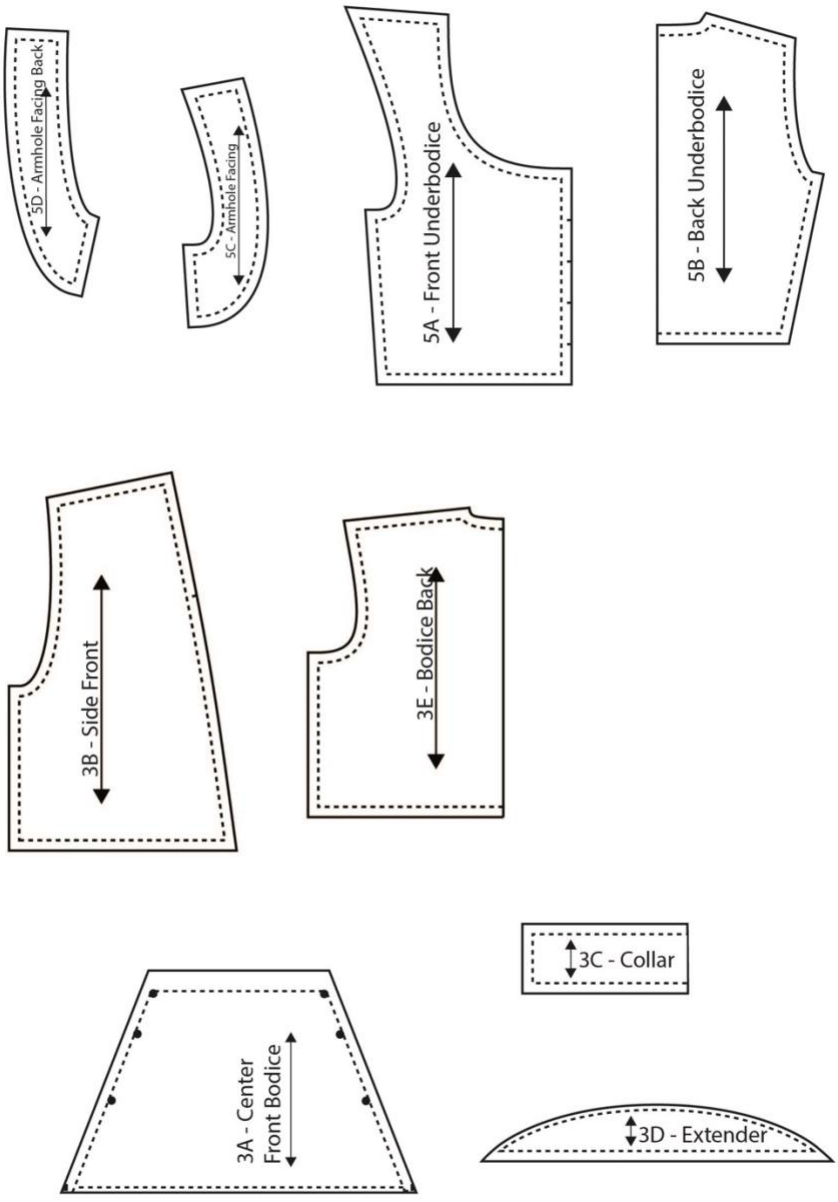
Cut Bias Tape

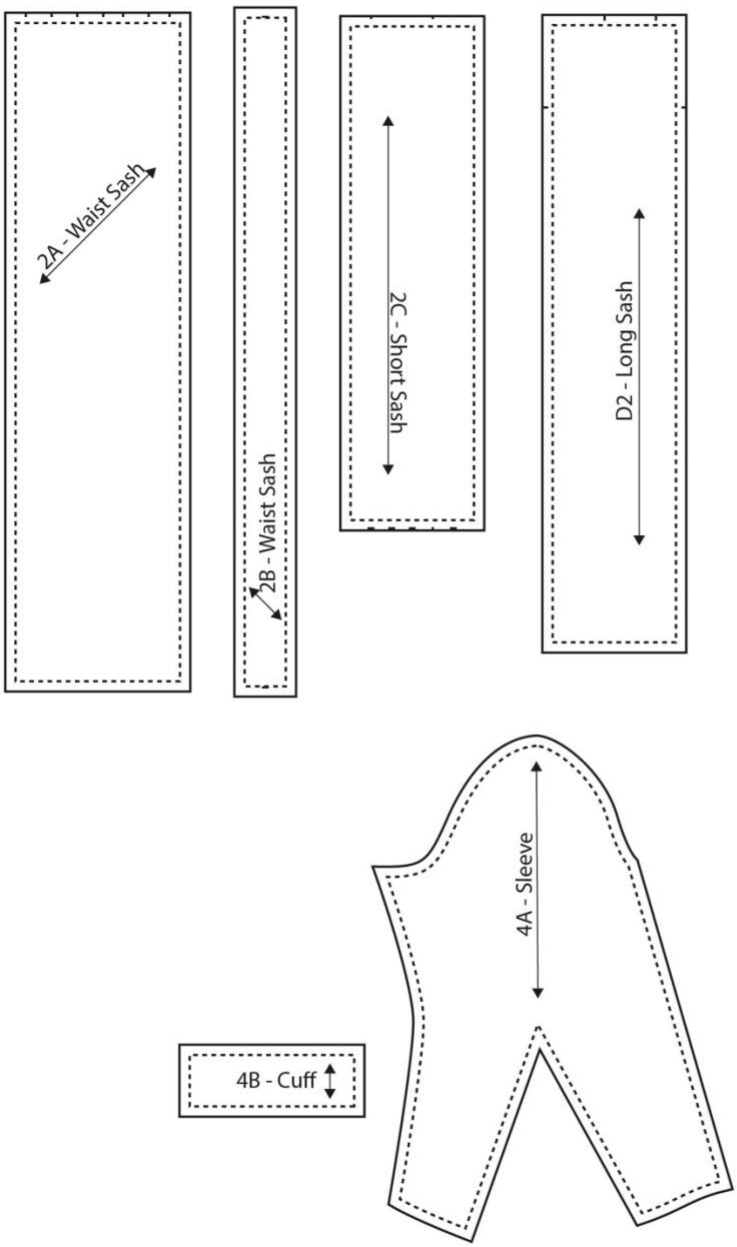
Appendix D: 1/8 Scale Patterns

Dress A

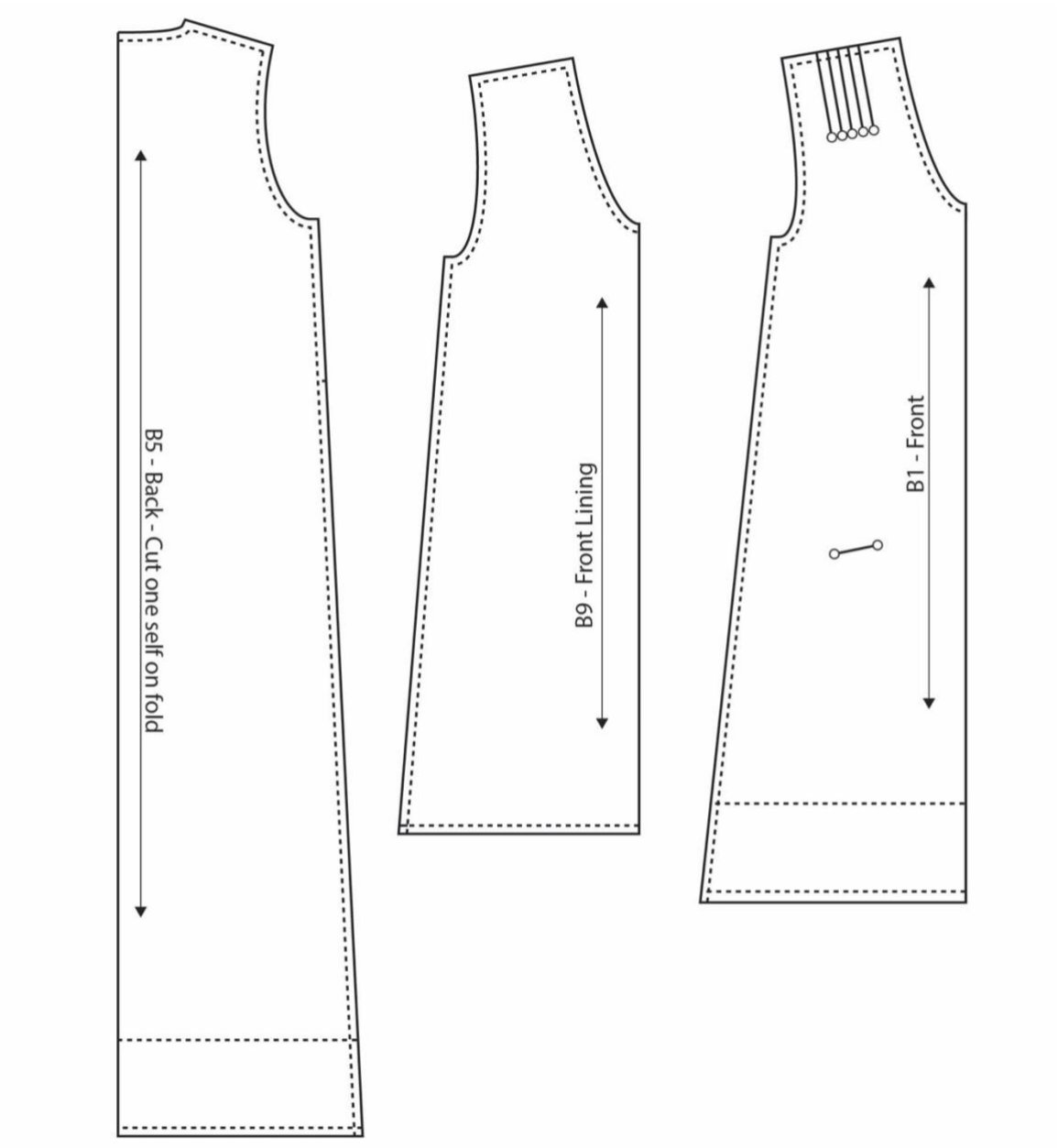


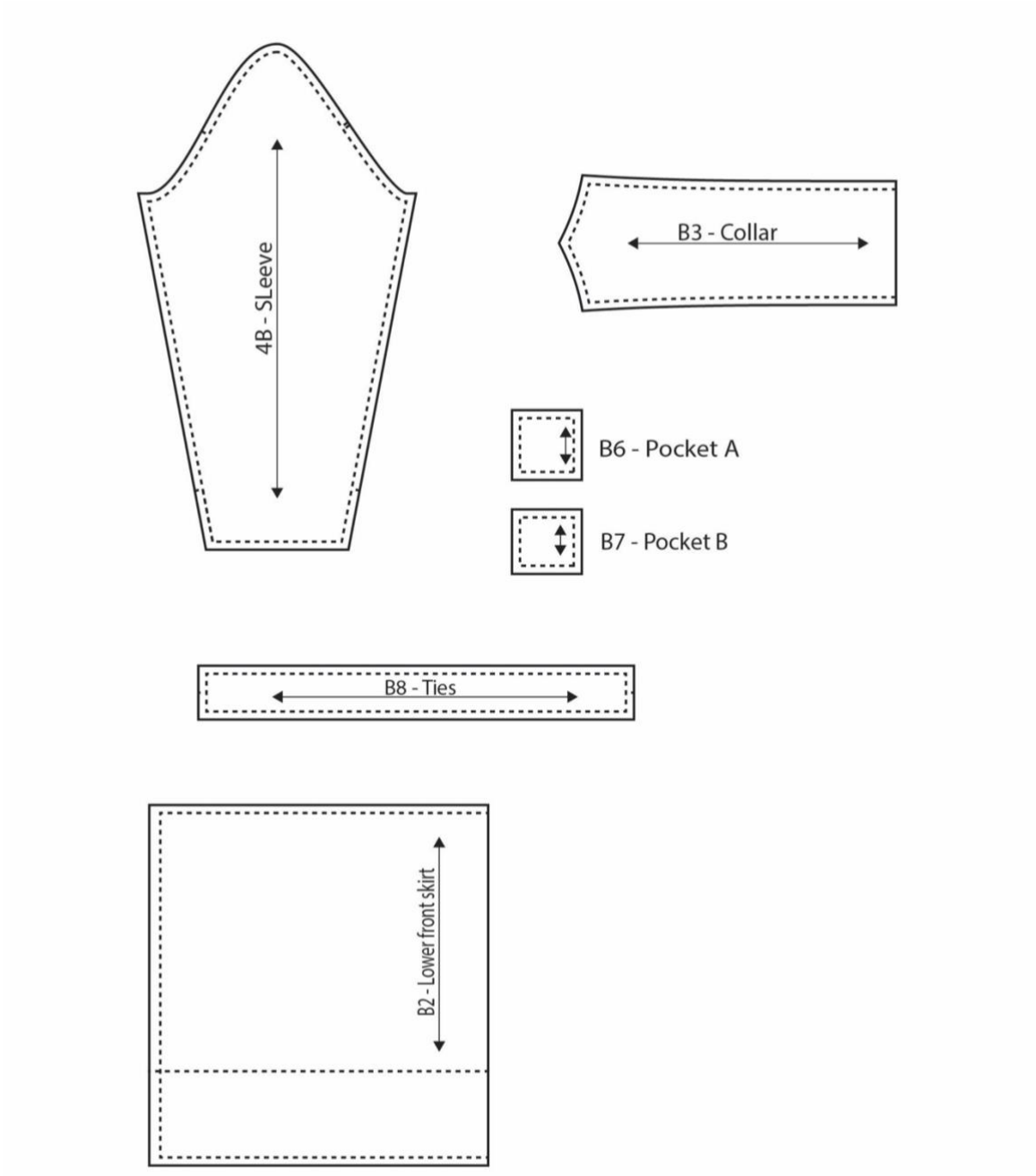



5D - Armhole Facing Back
5C - Armhole Facing
5A - Front Underbodice
5B - Back Underbodice
3B - Side Front
3E - Bodice Back
3C - Collar
3A - Center Front Bodice
3D - Extender


2A - Waist Sash
2B - Waist Sash
2C - Short Sash
D2 - Long Sash
4A - Sleeve
4B - Cuff

Dress B




4B - SLeeve
B3 - Collar
B6 - Pocket A
B7 - Pocket B
B8 - Ties
B2 - Lower front skirt