

# Transformable modeling: versatile women's collection

## Abstract

The present work had the objective to develop a collection of transformable feminine fashion. The starting point was the following problem: is it possible to provide versatility in women's clothing through modeling? Methodologically, the corpus of this work was constituted by conducting bibliographic and applied research with Treptow's design methodology (2013). The work presents the creative process, modeling and the photographic essay of two sought after looks. The generation of alternatives brings a collection containing five dresses and five overalls, from this collection two pieces were produced as a result of this work. The collection of women's fashion is based on a transformation: pieces that, with modeling resources, bulletin together, stand out to be used independently, with a different result from the initial proposal, or even pieces that when used overlap change the aesthetics look. The first piece is a transformable short dress that when joined with a skirt becomes a long dress, and the second piece is a long transformable jumpsuit that, with the removal of the bars, turns into a short jumpsuit. The final considerations point out that the pieces developed brought together the essential aspects of transformable modeling: versatility and adaptability.

**Keywords:** female modeling, transformable modeling, versatility

Volume 10 Issue 5 - 2024

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**Received:** September 26, 2024 | **Published:** October 29, 2024

## Introduction

The current study effectively investigates the creation of a changeable feminine fashion line, posing the query of whether creative modeling approaches can lead to adaptability. The study combines bibliographic and applied research using Treptow's design approach<sup>1</sup> to provide a creative process and a photography essay of two noteworthy looks.

Five dresses and five overalls make up the collection, which emphasizes pieces that can be worn separately or combined for a variety of looks. A jumpsuit that can be shortened and a short dress that can be made longer are two notable examples. The emphasis on adaptation and versatility highlights how useful the clothes are for modern, busy ladies.

Although the discussion around transformable clothing models is still in its infancy, this work offers insightful analysis and recommends enhancements for larger-scale manufacturing. Women looking for affordable yet fashionable solutions will find the "Stripes" collection intriguing as it showcases how adaptable designs may prolong apparel lifecycles and lessen the need for frequent purchases.

Creating a line of transformable feminine fashion with creative modeling addresses the adaptability of women's apparel.

The research basis is strengthened by the appropriate application of Treptow's design approach.<sup>1</sup> Think about going into further depth on the particular applied research techniques employed.

The two highlighted looks are well-represented in the presentation of the creative process, which also includes the photographic essay. This section may be improved with more illustrations.

The explanations of the interchangeable pieces are interesting, especially the one about the clothing that changes from a short to

a long length. Gaining more understanding of the transformation mechanisms' operation may be beneficial.

It's a good idea to highlight how useful the clothing is for active women. Think about elaborating on customer comments to emphasize practical uses. Significant finding is that better uniformity is required for larger-scale production. Detailed recommendations for these modifications would enhance the text.

It's great that there is an emphasis on using adaptable designs to save down on clothes expenditures. This conversation would be improved if any sustainable production methods were highlighted.

It makes sense to investigate a larger spectrum of audiences and styles. Further research into possible target populations may guide future initiatives.

All things considered, this work makes a valuable contribution to the conversation around transformable fashion, and more polish could increase its influence.

## Objectives

### General Objective

Developing a transformable women's fashion collection.

### Specific objectives

- Apply the concepts of anthropometry, ergonomics, modeling and transformable modeling
- Generate alternatives
- Designing transformable patterns and making clothes.

## Problem

It is possible to provide versatility in women's clothing through the modeling?

## Theoretical background

### Anthropometry and ergonomics

Anthropometry is the term whose genesis is the measurement of human development. As such, it is the area of knowledge that studies the physical characteristics of a population, which is verified by measuring length and circumference.<sup>2</sup>

Fantucci<sup>3</sup> states that anthropometry is the study of the proportions, dimensions, postures and movements of the human body, resulting in anthropometric tables that refer to a specific population with specific characteristics.

Thus, the term anthropometry and ergonomics applied to clothing refers to a product that has the function of meeting the different biotypes of the population.

Iida<sup>4</sup> disseminates the concept of ergonomics as a scientific discipline related to understanding the interactions between human beings and other elements or systems, with a view to optimizing human well-being and the overall performance of the system. The definition of ergonomics was officially presented by the International Ergonomics Association (IEA) in August 2000 and extended to Brazil through the Brazilian Ergonomics Association (ABERGO).<sup>4</sup>

Ergonomics focuses on creating garments that provide comfort for human beings when performing their duties. It is worth noting that the choice of fabric is of great importance when designing a clothing product. For example, it would not be appropriate to create a garment for the summer collection using a wool fabric, as it would provide the wearer with thermal discomfort. Fabrics with natural fibers would be suitable for this collection.

In this sense, it can be seen that large companies, including textile companies, are improving their products in terms of ergonomics and design, seeking to improve the well-being of their end consumers. Iida<sup>4</sup> points out that in addition to biomechanical, physiological and cognitive aspects, ergonomics has also started to study emotional aspects in the relationship with products.

Felisbino<sup>5</sup> states that “a product must be ergonomically correct when it comes to comfort, movement mechanisms and safety”. A garment is considered comfortable when it uses appropriate measurements in its creation, i.e. points considered essential for the subsequent construction of the pattern must be measured, such as bust, waist and hip circumferences, among other measurements. When modeling, the exact measurements of the human body must still be added with the respective gaps, which according to Heinrich<sup>6</sup> “are measurements that go beyond the anatomical measurements of the human body”. According to the author, there are two types of gaps: the movement gaps, which allow body parts to move, or model gaps, which are gaps added with the aim of creating a certain silhouette, the contours of which have their structure modified, as there is no need to reproduce their anatomical shape.

It is therefore believed that the sizing of clothing is of great importance in order to include safety, comfort, aesthetics and protection, for which there must be a sense of size, proportion and scale of the human body.<sup>7</sup>

Also considering product ergonomics, Martins<sup>8</sup> explains that “the human body is the starting point for the correct sizing of a product. Therefore, the human scale is our reference”. This highlights the importance of the *designer* and other textile professionals knowing the anthropometric data of the target audience, as well as the ergonomic

aspects that should be used to make this product, in order to provide well-being for end users.

### Modeling

The modeling process goes far beyond simply sketching out lines and shapes on a piece of paper or using *software*. This process is associated with anthropometric and ergonomic analysis, aiming to meet the various characteristics and proportions of your target audience. The more details that are analyzed during the product development phase, the better the result expected by the end user, meeting their needs and providing for their well-being.<sup>9</sup>

Treptow<sup>1</sup> explains that modeling “is to fashion design as engineering is to architecture”, as it is the beginning of the production cycle. The pilot piece is created based on the pattern and, once approved, the product goes into series production. Mandelli<sup>9</sup> emphasizes the importance of pattern-making and acknowledges that “the profession of pattern-maker is highly valued by the clothing industry, since pattern-making is one of the essential items for a well-made product and for pleasing customers”.

When detailing this modeling process, Mandelli<sup>9</sup> points out that “each of the parts that make up a model must receive the necessary identifications, such as model, name, size, number of times it must be cut, among others”.

Clothing design involves knowledge inherent to design thinking, such as planning, methodology and the selection of resources used to solve creative and productive problems.<sup>10</sup>

In this sense,

Modeling knowledge in fashion design favors the generation of innovative configuration ideas and involves the conception of clothing product shapes based on body structure, textile materials, needs and requirements to be met, supported by a broad knowledge base from various areas of knowledge.<sup>10</sup>

In order to apply the modeling skills explained above to the process of creating the final product, the *designer* has three modeling techniques at her disposal: two-dimensional or flat, three-dimensional or computerized.<sup>11</sup>

Two-dimensional or flat modeling uses paper as its main resource, preferably of a heavier weight, to graphically represent the shape you want to work on, be it a skirt, pants or the base of the body. Rulers, curves and other instruments suitable for tracing are used as resources.<sup>12</sup>

Three-dimensional modeling, on the other hand, uses the human body itself or a specific mannequin as a resource by manipulating textile materials on them.<sup>11</sup>

In computerized pattern-making, according to Spaine,<sup>11</sup> clothing patterns are developed using specific *software*, which can be two-dimensional or three-dimensional, depending on the compatibility of the *software*. Mandelli<sup>9</sup> adds that with the help of these computerized technologies, the pattern maker can create all kinds of patterns, graduating to the desired sizes and fittings. He also points out that these tools facilitate and speed up pattern-making work, making it possible to produce higher quality results and also saving fabric.

The patterns produced in this work are intended to provide versatility in the fashion product. With the help of modeling, it was possible to create a versatile and transformable garment. Two-dimensional modeling was used to make the garments in this work, using heavier paper in white. The patterns for the dress and skirt

are hand-drawn, with a v-neckline, sleeves and skirt waistband. The jumpsuit was designed with a v-neck, pence, sleeves and a seam in the part of the pants where the transformation takes place.

It is essential to include the seam allowance when creating patterns. Generally, the seam allowance is 1 cm (centimeter) for plain fabrics and 0.5 cm (centimeter) for knits. Knowing and understanding sewing techniques in order to provide the correct seam allowances avoids wasting fabric and possible problems with the fit and final measurements of the pattern.

In patternmaking, you should never forget to use seam allowances, pique markings, gathers and pleats, when creating cut-outs, all of which should be redone by adding seam allowances. And always identify which part it belongs to, for example, cuff, sleeve, back, etc. and also don't forget to mark the thread (FULCO; SILVA, 2008).<sup>5</sup>

The use of good practices in the modeling, cutting and assembly processes results in products with a good fit, correct structural lines, balance and aesthetic beauty. In addition, it is in line with the product quality policy and end user satisfaction.<sup>13</sup>

### Transformable modeling

Transformable modeling is related to the adaptability and versatility that garments provide to the wearer, through operations such as overlapping, removing or adding layers to the *look* originally worn by the wearer, among other possibilities. In this context, Bolton<sup>14</sup> points out that "individuals who wear transformable or reversible clothing do more than simply put on or take off layers, they transform the reading of the garment".<sup>15</sup>

For a garment to be classified as transformable, two requirements must be met: the first is the need for at least one other possibility of construction; the second is the possibility of the garment returning to its original form after being transformed (QUINN, 2002).<sup>15</sup>

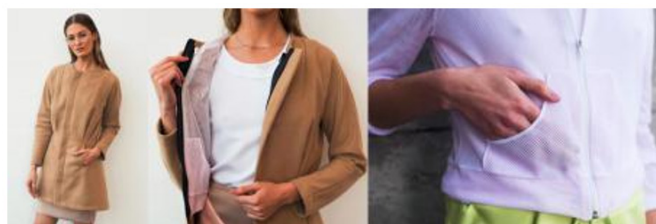
The essential characteristic of transformable clothing is form and function, highlighting the way it is constructed.<sup>16</sup> In fashion, transformable design allows one garment to become another. This transformation takes place through manipulations to its structure, using zippers and press studs that allow one part of the garment to be joined (or separated) from another. Thus, the garments can be used for more than one purpose.<sup>17</sup>

There are three different types of transformable clothing. The first is transformed by reorganizing its surface, such as detachable garments. The second is any garment that can be transformed into two or more pieces as long as you can bring it back to its original shape. And the third type is based on modularity, which a garment created through manipulable modules, bringing various shapes and structures (QUINN, 2002).<sup>16</sup>

The first type of transformation proposes altering the product simply by reshaping its surface, either its appearance or its texture. An example is a jacket that can have a plain color on one side and a print on the other, allowing the user to create two different *looks*. Machado (2011) includes in this group transformations in appearance or texture resulting from ageing processes or wear and tear to which fabrics may be subjected. As shown in Figure 1:

Barbosa<sup>18</sup> states that the use of reversible clothing, resulting from the organization of its surface, provides conscious consumption based on the tripod: practicality, sustainability and economy. Adopting this practice has the effect, for example, of optimizing space in closets and suitcases, since the same *look* will suit different situations: casual and

formal; and the possibility of wearing different outfits throughout the day, without the need to carry other items of clothing.



**Figure 1** Overcoat with pocket that transforms into a sports jacket.

**Source:** MORO; LUGLI, 2016.

The second type of transformable garment is reversible clothing, which has innovative ways of attaching its components.<sup>15</sup> An example of this is a multiform dress, which allows you to create different *looks* using its fastenings. As shown in Figure 2:



**Figure 2** Skirt that turns into a dress-coat and the blouse that turns into a skirt with ties.

**Source:** MORO; LUGLI, 2016.

The third type of transformable is clothing that can be converted into multiple *designs*, including objects, through a system of modules.<sup>15</sup> This concept includes a product that can be used simultaneously as a hat and a bag, or a jacket that, after removing its removable sleeves, becomes a vest. As shown in Figure 3:



**Figure 3** Blouse that turns into a bag.

**Source:** MORO; LUGLI, 2016.

Modular products can be combined with other products in the same line, providing a wide range of conventions.<sup>19</sup>

The aesthetics of transformable clothing follows two principles: deconstruction and reconstruction, both of which focus on the constructive aspect of clothing. Deconstruction focuses on the construction of new garments from old ones. To do this, an old garment is dismantled into its different parts, a new arrangement is put together



with these parts and they are sewn back together, giving rise to a new product. Reconstruction, on the other hand, does not involve unfinished or destroyed aspect of deconstruction. Reconstructed clothing is based on decontextualization. The process of deconstruction consists of understanding the meaning and characteristics of an object in order to produce a new object where the essence of the first is decontextualized (QUINN, 2002).<sup>15</sup>

Transformable clothing has characteristics of both aesthetic principles, and has a range of trims that can be used in this construction process. Zippers, buttons and Velcro are items that go beyond their proper functions, contributing to the aesthetic finish of this new garment (QUINN, 2002).<sup>15</sup>

It's important to clarify that the wearer is like the operator of the garment. They operate and transform it according to the changes created by the *designers*, and these changes are purposefully constructed for greater interaction between them and the garment.<sup>16</sup>

In this sense, transformable fashion enables “the playful and creative participation of the wearer and, by adapting to personal needs and preferences, can bring a sense of lasting satisfaction”.<sup>20</sup>

### Methodological procedures

In terms of its nature, this research is characterized as applied, as it “aims to generate knowledge for practical application aimed at solving specific problems”.<sup>21</sup> As for the approach, it is exploratory research, making it possible to understand modeling and transformable modeling. “The purpose of exploratory research is to provide greater familiarity with the problem, with a view to making it more explicit or building hypotheses”.<sup>22</sup> The research used the applied design methodology, which is specific to the fashion industry in order to develop two *looks*.<sup>1</sup> Three stages of the methodology proposed by the author were used: research, planning and development.

The study had three specific objectives, the first of which was to revisit the concepts of anthropometry, ergonomics and transformable modeling and apply them to fashion products. The second objective was to generate fashion alternatives/designs to make two *looks* (2 transformable garments that can become four garments), creating ideas that solve the problem proposed by the work. Of the 10 alternatives generated, two *looks* were chosen for making. The third objective was to develop the transformable pattern and make the clothes; the production of the garments was based on the application of versatility in two fashion *looks*.

### Research and collection planning

Treptow<sup>1</sup> states that “research should be a constant in the life of the fashion *designer*”, as it makes it possible to translate the feelings and changes in consumer behavior into products. Therefore, “Stripes” was chosen as the theme for the collection, as it is a timeless aesthetic that can remain popular in the fashion market for many years. For Treptow,<sup>1</sup> planning includes analyzing production and commercial viability and its coherence as a collection. At this stage, the target audience and product *mix* were decided.

The target audience was defined as modern women with busy routines who need a product that caters for different occasions in their daily lives.

The product *mix* has 10 models, with 5 dresses and 5 jumpsuits. We decided to produce two different models: a dress and a transformable jumpsuit.

With regard to planning, Treptow<sup>1</sup> explains that it is “a broad concept that encompasses decisions from defining the schedule and product mix to promotion and distribution strategies and market *feedback*”.

Figure 4 shows the generation of alternatives drawn up by the author, containing five transformable dresses and five jumpsuits.



**Figure 4** Generating alternatives/Research.

**Source:** prepared by the author, 2020.

In relation to drawings, representation and technical drawing are essential in design to present key elements of an artifact without using propositional language,<sup>23</sup> so it is possible to “properly understand all the orderliness that exists from the conception of a device to its full realization”.<sup>23</sup>

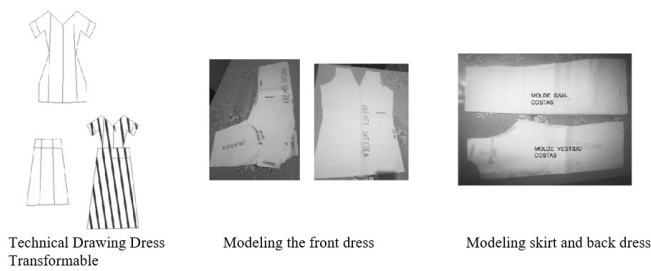
Alternative 1 was chosen to be made into a dress with a V-neckline, knee-length, which can be made into a long dress by removing the elasticated waistband and two front and two back zips, a pantacourt style. Alternative 2 features a V-neckline with short sleeves, a jumpsuit that can be turned into a long or short pantacourt.

Alternative 3 is a jumpsuit, with a smaller V-neckline and sleeves, with elastic at the waist, pantacourt style, which can be removed and the hem put on at knee height. Alternative 4 is a dress, consisting of a round neck collar, with an opening at the front, short length above the knee, pantacourt model. Alternative 5 is a jumpsuit, with a V-neckline, sleeves, four pences, two above the waist and two below the waist, and can be removed at the knee, pantacourt model. Alternative 6 is a tight-fitting V-neck dress with short sleeves and a slit in the skirt.

Alternative 7 is a tight-fitting, short dress with long sleeves and a deep V neckline, overlaid with a long skirt with a waistband. Alternative 8 is a tight-fitting dress with a short V-neckline and short sleeves, overlaid with a long skirt with a waistband. Alternative 9 is a tight-fitting V-neck dress with long sleeves and a straight skirt without a waistband. Alternative 10 is a tight-fitting dress with a V-neckline, long sleeves at the waist, a short model, and a long skirt with a waistband.

### Collection development

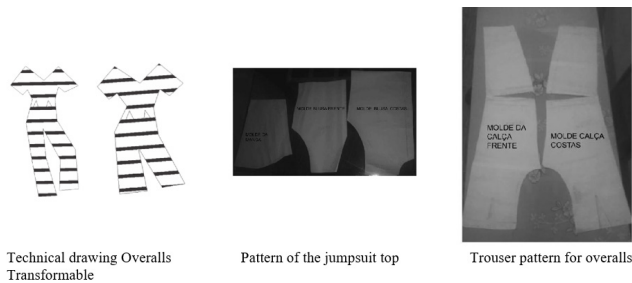
The first *look* is a short dress with a tight fit, a V-neckline and short sleeves. When overlaid with a long straight skirt with a waistband, it becomes a long dress. This *look* offers versatility, as it can be worn three different ways: short dress, long skirt or long dress, when these pieces are worn together. Aesthetically, a vertical striped print was chosen. Figure 5 shows the process of creating the transformable dress, with the technical drawing and modeling of the garment:



**Figure 5** Creation and modeling process - transformable dress.

**Source:** prepared by the author, 2021.

The second *look* is a transformable jumpsuit, which can be worn short or long. With short sleeves and a V-neckline, the jumpsuit has press studs below the knee, so that part of the legs can be removed and replaced, allowing for different lengths. The fabric used in both *looks* was striped viscose. Figure 6 shows the process of creating the transformable jumpsuit, with the technical drawing and modeling of the garment:



**Figure 6** Creation and modeling process - Transformable jumpsuit.

**Source:** prepared by the author, 2021.

## Results and discussions

This topic presents the models created for the versatile women's collection, with a transformable modeling proposal. As the work progressed, it was discovered how to design a collection and make *looks* that can be transformed.

It was understood that clothes can be transformed using transformable materials and patterns. The striped fabric fits in with the garments made. What sets this collection apart is that the clothes can be versatile and the pieces can be worn in different ways.

According to Mandelli,<sup>9</sup> the pattern-making process must contain information identifying the product model on the patterns. The work brings images containing the information of the patterns representing, in detail, each part that makes up the pieces produced: front dress pattern, back dress pattern, sleeve of the jumpsuit blouse, pants pattern mainly, the parts that can be transformed.

Vereta<sup>17</sup> states that a transformable design is a product that can be modified into one or more pieces through the use of trims. In the jumpsuit, this work, snap fasteners were used, allowing the garment to be transformed into long and short overalls. Applying the versatility of its use.

From the definition presented by Quinn (2002), it can be seen that the transformable garments developed (dress and overalls) meet two essential requirements: 1) they offer another possibility of construction; and 2) they can return to their original form after being transformed.

The garments produced were made to measure and the result can be seen in the images below (Figures 7–10) as well as the finishes on the tight-fitting dress, with a zipper at the back, a V-neckline and short sleeves. The skirt is straight, with a waistband and side zipper, and can be worn as part of the proposed *look* or not, expanding the possibilities of use.



**Figure 7** Dress details.

**Source:** prepared by the author, 2021.



**Figure 8** Skirt details.

**Source:** prepared by the author, 2021.



**Figure 9** Jumpsuit details.

**Source:** prepared by the author, 2021.



**Figure 10** Photo shoot with the transformable pieces.

**Source:** prepared by the author, 2021.

The jumpsuit has short sleeves, a V-neckline, elastic above the waist and can be worn long or short, thanks to the press studs at knee height, as shown in Figure 9 and Figure 10.

Figure 10 shows the transformable garments made in a photo shoot. It can be seen that according to Quinn's (2002) definition, the dress and jumpsuit developed fall into two distinct types of transformable garment: 1) it can be transformed by reorganizing its surface (the jumpsuit has detachable legs, can be worn short or long); and 2) a garment that can be transformed into two or more pieces and can return to its original form (the dress can be worn short; it can be transformed into a long dress by overlapping the skirt; and the skirt can be worn alone).<sup>24</sup>

## Final considerations

To design this collection, the preliminary study was based on the following problem: is it possible to provide versatility in women's clothing through pattern-making? We studied the various ways of creating a pattern and constructing a transformable garment, helping to produce pieces that would make sense to the wearer: a contemporary woman with a busy routine. The debate on transformable garment modeling is still recent and there is little bibliography to consult.

We chose to attach a few functions to the garments so that they are a facilitating element in everyday life, rather than the opposite. When it comes to transformable garments, it is necessary to make improvements and adjustments so that the clothes can be produced on a larger scale, such as standardizing the sizes and location of the trims for joining and/or separating the garments.

It can be said that the "Stripes" collection brought together the expected aspects of transformable garments by optimizing the useful life of clothing through versatility and adaptability, as they can be used for different occasions. The fact that the garments can be worn in different ways and have classic, timeless fabrics and patterns can influence the reduction in new clothes purchases. It can be inferred that women with little time in their routines will be attracted by the product's design and versatility.

It is hoped that this text on transformable fashion will contribute to further discussions about the feasibility of making products with a focus on versatility. For future work, it is suggested to create more types of clothing related to the subject, in order to reach different styles and audiences.

## Acknowledgments

None.

## Funding

None.

## Conflicts of interest

The authors declare no conflict of interest.

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