



Applying Storyboards to Fashion Design for Empathy

Chien-Chih Ni^{1,2(✉)}, I-Ting Wang², and Hsien-Fu Lo²

¹ Hsuan-Chung University, Hsinchu, Taiwan

² National Taiwan University of Arts, New Taipei City, Taiwan
etinw@ms43.hinet.net, nancynil008@gmail.com,
hsienfulo@gmail.com

Abstract. Taking Pinocchio as the starting point of design, this study applied scenarios to fashion design. Fashion is people's second skin, and wearing clothes is a psychological and physiological reflection as well as an emotional and cognitive reaction. With stories as the main axis, this study designed six sets of fashion for gender transformation. In the questionnaire survey, 111 subjects evaluated the masculinization or feminization of fashion according to nine fashion design elements. According to the analysis of the questionnaire survey results, Fashion D and Fashion F were the most masculine, and proportion of garment, sense of design, and overall image were the most distinctive features of masculinization. The most significant difference in the reaction to the masculinization or feminization of fashion between the male and female subjects occurred with Fashion B, especially in regards to proportion of garment and trousers, sense of design, and overall image. The results can be taken as a reference for the expression of gender in future fashion design.

Keywords: Empathy · Empathic design · Fashion design

1 Introduction

During the past century, fashion design has gradually separated itself from the concept of the second skin, and the function of fashion has developed from one of physiological demand to social and psychological demands. Aside from leaving a specific impression on others, wearing clothes also has an effect on the individual. The multi-dimensional perceptions, social factors and symbolic correlations of fashion all have influence on the feelings of the people wearing it and those who see it. Corrigan [5] said the order of the society is the order of the dress, one's occupation, class, age, sex, gender, region, and religion can be interpreted by what he/she wears. With the incorporation of diverse cultures into design, fashion has become a medium for self-expression. People indicate sex, age, and identity recognition through fashion. Therefore, fashion can be regarded as an expression of contemporary life and attitude.

In an era where physiological and psychological gender has become blurred, personal sexual awareness has gradually attracted attention. Hence, people have begun self-assertion, self-performance and self-expression through fashion. An increasing

number of females are dressing themselves in masculine clothes, and elements which were once considered feminine have been found in clothes for males. Clothes for both sexes now occupy a position in the existing fashion markets for both men and women. This manifests that a person's attitude towards sex identity and the selection of popular fashion has becoming increasingly diverse.

This study was divided into two stages. In the first stage, six sets of fashion were designed on the basis of the design curriculum and the story structure of Pinocchio. The story was adopted to change the style and look of the fashion to discuss key factors for the fashion design based on stories. In the second stage, a questionnaire survey on the six sets of fashion was conducted to find out the factors that influenced consumers' and viewers' evaluation of the masculinization or feminization of the six sets of fashion in terms of style and look, so as to provide a reference for the sexual orientation of future fashion design.

2 Story Application

2.1 Scenario: Pinocchio

Scenarios are a frequently-used mode in design. The telling of a story creates a scenario for designing products that are suitable for users. Most of the traditional design modes elaborate on the relationship between objects and design functions from the perspective of the designer. However, they neglect the differences caused by various understandings between designers and users of the productions [13]. Scenarios can be used to analyze the interaction between people and products through a true or imaginary story, including features of the users and events, and the relationship between product and environment, in the development of products [14]. Nardi [11] believed that scenarios can be used to describe a future life and how future technologies could help users. It can provide a definite and specific imagination. Carroll [3] argued that scenario plays the role as an instructive tool in the communication of design, helping developers with the procedure and response of design as well as the management of design situations.

Pinocchio tells the story of a piece of wood turning into a living puppet. Brave, honest and selfless, the puppet is transformed into a real boy. The transformation from the puppet's birth to his experiences and the desire to become a boy is like that of cloth and material which expect to be turned into fashion. The design concept of Pinocchio desiring to become a boy reflects the fashion style of self-expression in the combination of two perspectives, fashion and viewing, in current society. In fashion design, scenarios can bring multi-dimensional and instructive design thoughts and make fashion design more suitable for consumers and users.

2.2 Elements of Fashion Design

There is a wide range of fashion designs, and different demands and functions will lead to different design thoughts. As far as overall conception is concerned, fashion design can be divided into three layers, namely, functional purpose, form and technique, and the cultural meaning of design. The functional purpose of fashion design emphasizes the

occasion and purpose of wearing clothes, such as fashion for athletes, common leisure fashion, and suits for official occasions. The functions of fashion causes designers to think about the form and culture of fashion. The forms and techniques of fashion come after the functions of fashion. According to the literature, color, material, profile, proportion, detail, and integrity are all found in form and technique, which have the most direct effect on consumers' preferences for and evaluation of fashion. The final layer of fashion design lies in cultural meanings or the signs and information that fashion delivers [4, 17, 18]. Therefore, some designers incorporate historical signs and patterns into fashion design, and some adopt popular culture elements, art works or spiritual concepts for fashion design, so as to convey the cultural meaning of design. Fashion design integrates function with design meaning and technique. Apart from satisfying consumers' material demands, fashion must be consistent with consumers' psychological responses. Meanwhile, the popularity of fashion can also be seen as an ideology being understood and recognized in a group. Fashion is not only a daily necessity of life but also a product of cultural creativity showing a humanistic style [18].

In fashion design, designers transform creative ideas into specific popular fashion looks in a systematic way through the sense, style and look of fashion. The presentation of a look is an essential index which guides the creative ideas of fashion and generates popular elements [8]. How designers turn disordered thoughts and creative ideas into a systematic connection, manifest the message of traditional aesthetics through design, and deliver it to consumers and arouse consumers' resonance are challenges facing all fashion designers today. The basic constituents of fashion design include material (selection of cloth), structure (fashion model), form (fashion style), and function (occasion and viewer). Under the interaction between designs, fashion can be taken as a tool to show emotions and express individuality, as well as the interaction with others in society [7].

According to what has been mentioned about the three layers of fashion design, fashion is not only an appearance based on wearing clothes, but also a reflection of the designers' and users' thoughts on fashion.

2.3 The Relationship Between Clothes and Humans

In all eras, fashion has been indispensable for humans. The most basic three functions of fashion and Maslow's five basic needs of humans are consistent with the transformation of individuals' psychological demand for fashion. People select the clothes to show their personal traits. For instance, lace indicates feminization. Therefore, fashion influences individuals' thinking and behavior.

Many psychologists, sociologists and anthropologists have tried explaining humans' motives for wearing clothes. According to the theories, three functions of fashion can be found in the history of human evolution: physiological functions, social functions, and psychological functions, which are used to explain the transformation in human's understanding of the importance of fashion.

Physiological Function: The Second Skin

As a layer between the human body and the external environment, fashion is expected to protect the body and keep it warm. Throughout history, different materials such as

plants and the animal fur have been used for the above purposes. According to Maslow, only after the most basic demands for existence, including food, clothing, accommodation and travel, are satisfied will humans move on to the demands in the next layer. In terms of the demand for safety, fashion can be taken as a safety mechanism to prevent individuals from injury or threat. People's demand for fashion will also change with the environment. Fashion can protect the human body from being harmed in the workplace, natural environment, daily life, or sports. An appropriate fashion will not restrict human movement; instead, it will protect the body in an appropriate way.

Social Function: Fashion Style

Fashion has multiple layers of social meaning. Apart from revealing personal traits and identity, fashion manifests itself in eras, region, politics and culture. Hence, individuals can tell the occupation, age and sex of a person through the way he/she is dressed; moreover, they can even imagine the possible social patterns where the fashion user lives. The third demand in Maslow's theory is the demand for belonging and love. Individuals need to belong to a group and hope to be accepted and concerned by the group. They long to love others and be loved. The subtle changes in emotion are significantly more minute and elusive than those for physiological demands. The fourth demand is the demand for respect, which means an individual's social status and recognition of his/her capabilities. When an individual's demand for respect is met, he/she will feel confident and recognize his/her value. Fashion will change with social circumstances, and a person living in society will always want to become part of a group or society and get a sense of belonging. Therefore, he/she will select clothes according to the latest fashion trend, thereby seeking the acceptance of his/her group through fashion.

Psychological Function: Personalization

Fashion is not only a part of appearance and an extension of self-will, but also an expression of personal emotions. Hence, an individual will dress himself/herself according to time, space, mood, preference and occasion. The highest demand in Maslow's theory is the demand for self-achievement, which means that an individual tries his/her best to fulfill dreams and aspirations and become the person he/she wants to become. The appearance of clothes is closely related to the way a person views himself/herself. Different people have different life experiences, and there will also be differences in the development of self-recognition. As a result, people will have different opinions on the collocation of clothes. Aside from the differences between individuals, a person's self-recognition will constantly influence his/her clothing choices throughout his/her personal growth. In other words, an individual will reconstruct his/her preferences for clothes according to the information he/she receives in different growth stages. Throughout personal growth, he/she will continuously seek a relationship with fashion.

2.4 Design for Empathy

Tim Brown [2] said that "empathy is at the heart of design. Without the understanding of what others see, feel, and experience, design is a pointless task." According to western countries, empathy is a concept which was first proposed by Robert Vischer in

the form of *Einfühlung* in 1873. In 1897, Theodor Lipps adopted experimental psychology to analyze aesthetic empathy, believing that the reason for aesthetic appreciation lay in the mind rather than in objects and in subjective factors rather than objective factors. Scholars have come up with different views on empathy. For example, Lipps proposed the inner imitation and the outward imitation [10]. Edward Bullough, from the University of Cambridge and University of Oxford, put forward the theory of psychological distance [9]. From the perspective of literary psychology, Zhu Guangqian regarded projection as “projecting a person’s cognition and emotion onto objects to make them in objects” [9]. It is possible to divide reflections around empathy into two main dimensions. The first may be seen as emotional empathy, which is an instinctive, affective, shared, and mirrored experience. The other dimension of empathy is cognitive, in which an individual understands how other people may experience the world from their point of view [6, 12, 15]. Being empathy or sympathy and being revealed through emotion or cognition, empathy in design can contribute to a closer communication between designers and users, thus allowing designers to get to know the users’ demands and make their designs more suitable for users.

According to Froukje Sleeswijk Visser and Kouprie [16], empathy is an individual’s ability to identify with and understand another person’s feelings, ideas and circumstances. For designers who have not directly been in contact with the users they receive information about, special attention must be given to the communication of user insights. Katja Battarbee, Jane Fulton Suri, and Suzanne Gibbs Howard [1] defined empathy as the ability to be aware of, understanding of, and sensitive to another person’s feelings and thoughts without having had the same experience.

Brown [2] stated that individuals build bridges of insight through empathy, including the effort to see the world through the eyes of others, understand the world through their experiences, and feel the world through their emotions. In *Emotional Design*, Don Norman [13] said that products must be attractive, pleasant, and interesting, and that people’s feelings about using products must be valued. Individuals’ feelings of beauty and emotion must be considered in design. Therefore, empathy-based design is important for design. In fashion design, empathy means prioritizing users and getting to know consumers’ physiological, social and psychological demands for fashion, so as to make clothes that psychologically satisfy users while expressing fashion design and beauty.

3 The Framework of the Research

This study was divided into two parts. In the first part, scenarios were applied to fashion design. In the second part, a questionnaire survey was conducted to understand the differences in cognition of the masculinization and feminization of clothes among consumers.

3.1 Scenario-Based Fashion Design

The fashion design of this study was based on the graduation projects of four students from August 2015 to June 2016. For each week, four hours were spent on discussion.

After class, the students designed and made clothes according to the results of the discussion. The course lasted for 34 weeks. As a conclusive course for students majoring in fashion design, it aimed to help the students apply the concepts and designs of integrated fashion, develop the ability to work as a learning group according to the fashion trends, and develop design thinking. The story of Pinocchio was taken as the design theme for the four students. The possibility of designing the gender concepts of the story through the reading and analysis of the story was combined with the concept, practice design thinking, and popular trends to lead the students to develop people-oriented thinking. In the design discussion, Pinocchio was integrated with scenarios for the design to reflect that the cognition of gender can change through wearing clothes through the concept of a puppet’s desire to become a boy. It was hoped that it will be considered as a demand in fashion design.

As shown in Fig. 1, fashion designers need to take viewers and consumers into consideration to make empathetic design. For consumers, what feeling will the clothes bring? What is the perspective of a viewer? These questions must be considered by designers.

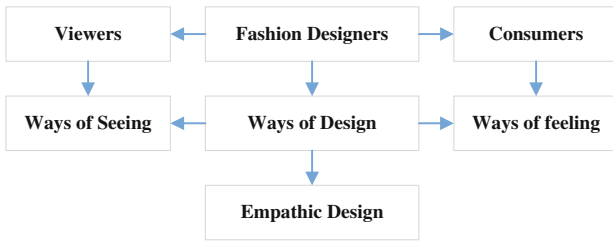


Fig. 1. Relationship between the empathetic design of clothes, viewers and consumers.

3.2 Scenario-Based Design Procedure

Scenarios were adopted to analyze the story of Pinocchio, which led to three design axes: (1) a girl wanting to become a boy; (2) a man wanting to become a boy; and (3) a puppet wanting to become a boy.

The first scenario (a girl wanting to become a boy) presented a masculine style and visual effects on a woman’s clothes. Therefore, masculine factors were added into the fashion design with the concept of uniform. The second scenario (a man wanting to become a boy) consisted of adding a child’s factors into the transformation of identity and mind from a man to a boy on a man’s clothes, so as to reveal a man’s desire to become a boy. The third scenario (a puppet wanting to become a boy) consisted of re-dissembling and reconstructing the process of transforming a puppet into a boy on a man’s clothes to show the process of transformation (Table 1).

Table 1. Pinocchio scenario-based fashion design concepts

Design idea	Design concept	Development item	Design factor
A girl wanting to become a boy	Add masculine style into a uniform	A woman's clothes	Use warm colors. Take cotton and linen as the main material. The jacket is short and the trousers fit. Different clothes are adopted to show details.
A man wanting to become a boy	Add a child's factors into a uniform	A man's clothes	Combine cold colors with warm ones. Take plain weaving fabric as the main material. The jacket is short and the trousers fit. Loose or straight trousers; show details through the thread.
A puppet wanting to become a boy	Re-dissemble the uniform and explore the transformation from a puppet into a boy through deconstruction	A man's clothes	Take blue as the main color. Take jeans as the main material The jacket is long. Show details through the collar and trousers.


3.3 Questionnaire Design

Through a literature review and data analysis, nine evaluation factors of fashion design were chosen for the questionnaire of this study, and six sets of fashion made through empathetic design were applied to the evaluation of masculinization and feminization. The nine evaluation factors were color collocation, material application, proportion of jacket, proportion of trousers, detail, design sense, and overall image. The sample questionnaire was as follows (Table 2).

3.4 Experimental Design

The subjects of this study were individuals with a background of fashion, art design, and other professions. The total number of subjects was 111, including 37 males and 74 females. The number of subjects with a fashion background was 32; that of subjects with an art design background was 24, and that of those with a background from other professions was 55. The subjects ranged in age from 18 to 46. The researcher invited subjects to fill the questionnaire, which was distributed and completed on the Internet. It took about 15 min to fill in the questionnaire. The questionnaire included basic

Table 2. Questionnaire

<p>Sample A</p>			
<p>Color collocation</p>	<p>feminization</p>	<p>1---2---3---4---5</p>	<p>masculinization</p>
<p>Fabric application</p>	<p>feminization</p>	<p>1---2---3---4---5</p>	<p>masculinization</p>
<p>Proportion of jacket</p>	<p>feminization</p>	<p>1---2---3---4---5</p>	<p>masculinization</p>
<p>Proportion of trousers</p>	<p>feminization</p>	<p>1---2---3---4---5</p>	<p>masculinization</p>
<p>Style of jacket</p>	<p>feminization</p>	<p>1---2---3---4---5</p>	<p>masculinization</p>
<p>Style of trousers</p>	<p>feminization</p>	<p>1---2---3---4---5</p>	<p>masculinization</p>
<p>Detail</p>	<p>feminization</p>	<p>1---2---3---4---5</p>	<p>masculinization</p>
<p>Design sense</p>	<p>feminization</p>	<p>1---2---3---4---5</p>	<p>masculinization</p>
<p>Overall image</p>	<p>feminization</p>	<p>1---2---3---4---5</p>	<p>masculinization</p>

information, such as gender, age, profession, and the nine design factors of the six sets of fashion. A 5-point scale was adopted for the evaluation items, with scores ranging from 1 (highest level of feminization) to 5 (highest level of masculinization). There were altogether 57 evaluation items.

4 Results and Discussion

4.1 Scenario-Based Design Results

Scenarios can narrow the difference between domains and between thinking and language, and they can increase the efficiency and benefits of communication [14]. Taking the story of Pinocchio as the scenario, the mood of the transformation of roles was reflected in the fashion design. The story was considered to show the design factors of masculinization and feminization in current society. The four students finished the six sets of fashion. A girl’s, man’s, and puppet’s desire to become a boy were shown

through color, material and pattern for the transformation of gender design. The analysis of the results for the design concept and form of the six sets of fashion is shown in Table 3.

4.2 Questionnaire Survey Results

This study asked the following two questions: (1) Whether the six sets of fashion designed on the basis of a scenario were accepted by viewers and consumers? (2) What are the factors that influence public opinion on the masculinization or feminization of fashion? The analysis of the results of the questionnaire survey was as follows (Table 4):

According to the analysis of the means of the 111 subjects, four factors of Fashion D and five factors of Fashion F had the highest mean among the nine evaluation factors. Specifically, Fashion D scored the highest in fabric application, style of trousers, detail, and design sense. Fashion D represented a man's desire to become a boy. The blue fabric and jeans could fully express the transformation of mind. As for the style of trousers, the masculine waist and colorful thread revealed the details and design sense. Fashion F scored the highest in color collocation, fabric application, proportion of jacket, style of jacket, and overall image. The design axis of Fashion F was a puppet's desire to become a boy. The four different layers of blue fabric showed the transformation of mood, and the asymmetric collar of the jacket and the wide bound design of the waist increased the masculinization of the overall image.

The analysis of the differences of both sexes was as follows (Table 5):

According to the evaluation of the nine factors of the six sets of fashion between the male and female subjects, there was significant difference in color collocation, fabric application, proportion of trousers and style of trousers for Fashion A. This result indicated that the female subjects felt the masculinization of the four evaluation factors of Fashion A was stronger. There was a significant difference in the nine evaluation factors of Fashion B for all subjects, both male and female. The design concept of Fashion B was a man's desire to become a boy, and the design pattern of the fashion was for a man. The most significant difference was found in proportion of jacket, proportion of trousers, style of trousers, design sense, and overall image for the male and female subjects. In terms of proportion of jacket and proportion of trousers, Fashion B was relatively loose. For the female subjects, a loose design was masculine.

Following the overall means, Fashion D and Fashion F were the most masculine for all the subjects. It was also found that proportion of trousers had the lowest mean in masculinization. This result indicated that trousers had the least influence on the difference between masculinization and feminization. However, the T-test on the male and female subjects showed that Fashion B revealed the greatest difference in the masculinization or feminization of fashion, showing significant difference in the nine evaluation factors. This result demonstrated that the female subjects believed Fashion B to be more masculine.

Table 3. Pinocchio fashion design results







Code	Design idea	Image	Design concept	Clothing form and techniques
A	A girl → A boy		Hard fabric and masculine colors are adopted to show a girl's desire to become a boy.	Plain woven fabric is adopted; the jacket is made into a short feminine design to reserve female factors in the overall image
B	A man → A boy		Soft fabric is adopted to show a man's desire to become a boy	Loose design; threads is adopted in the jacket to show the suit collar and pocket, representing a hidden man's world
C	A girl → A boy		Hard fabric and masculine colors are adopted to show a girl's desire to become a boy.	The red underclothes are adopted to maintain female factors in the overall image. The lattice fabric and the dark color aim to underline male colors.
D	A man → A boy		Soft fabric is adopted to show a man's desire to become a boy	The collarless jacket shows the interest of a boy. The blue fabric and the jeans reveal the relaxation of a man turning into a boy
E	A puppet → A boy		A fashion profile with intense lines shows the limbs of a puppet	The color-block lines and the stitched fabric show the image of a puppet's limbs. The blue and green fabric manifest a puppet's desire to become a boy
F	A puppet → A boy		The design concept of dissemblance is adopted to show a puppet's limbs and desire to become a boy.	Take blue as the main color, and adopt four different layers of blue fabric to show the mood of transformation. The asymmetric design reveals the variety of a puppet's limbs.

Table 4. Sample D & F descriptive statistics

Variables	D (n = 111)		F (n = 111)	
	M	SD	M	SD
Color collocation	4.162	0.7204	4.18	0.8113
Fabric application	4.045	0.7674	4.045	0.7907
Proportion of jacket	4.027	0.7193	4.162	0.7925
Proportion of trousers	3.856	0.8826	3.622	1.0095
Style of jacket	4.045	0.7907	4.162	0.7573
Style of trousers	3.865	0.8789	3.757	1.011
Detail	3.946	0.8825	3.937	0.8558
Design sense	4.009	0.8257	3.964	0.8304
Overall image	4.09	0.7693	4.126	0.8215

Table 5. Difference in the masculinization and feminization of the six sets of fashion between the two sexes T-test (n = 111)

Sample	Variables	gender	n	M	SD	T value	Difference comparison
A	Color collocation	Female	74	2.473	.8636	2.701**	Female > Male
		Male	37	2.000	.8819		
A	Fabric application	Female	74	2.635	.9447	2.475*	Female > Male
		Male	37	2.162	.9578		
A	Proportion of trousers	Female	74	2.635	1.0673	1.988*	Female > Male
		Male	37	2.216	1.0037		
A	Style of trousers	Female	74	2.689	1.0589	2.141*	Female > Male
		Male	37	2.243	.9833		
B	Color collocation	Female	74	3.676	.8618	2.819***	Female > Male
		Male	37	3.162	.9864		
B	Fabric application	Female	74	3.541	.8631	2.312*	Female > Male
		Male	37	3.135	.8870		
B	Proportion of jacket	Female	74	3.743	.8610	3.946***	Female > Male
		Male	37	3.054	.8802		
B	Proportion of trousers	Female	74	3.595	.9351	4.029***	Female > Male
		Male	37	2.838	.9284		
B	Style of jacket	Female	74	3.851	.8709	2.556*	Female > Male
		Male	37	3.378	1.0097		
B	Style of trousers	Female	74	3.608	.9038	3.386***	Female > Male
		Male	37	2.973	.9856		
B	Detail	Female	74	3.635	.9001	3.193**	Female > Male
		Male	37	3.054	.9112		
B	Design sense	Female	74	3.568	.8123	3.372***	Female > Male
		Male	37	3.000	.8819		

(continued)

Table 5. (continued)

Sample	Variables	gender	n	M	SD	T value	Difference comparison
B	Overall image	Female	74	3.811	.8708	4.021***	Female > Male
		Male	37	3.054	1.0527		
D	Style of jacket	Female	74	4.189	.6959	2.799**	Female > Male
		Male	37	3.757	.8946		

*p < 0.05, **p < 0.01, ***p < 0.001

5 Conclusion

According to the questionnaire survey on the six sets of fashion designed on the basis of Pinocchio, the design featuring story empathy was found to enable the subjects to feel masculine factors. Fashion design requires psychological and physiological appeal; in other words, it needs both rationality and emotion. This study created designs based on a story and incorporated the story into current topics about gender in society to generate three design axes based on the story outline, in order to help students create empathetic designs showing both emotion and cognition.

According to the results of the questionnaire survey, Fashion D and Fashion F scored the highest in masculinization. Style of jacket and proportion of jacket were the most important dimension in the subjects' evaluation of the masculinization or feminization of fashion. The second most important dimension was overall image. It was also found that proportion of trousers did not lead to a significant difference in masculinization or feminization. The difference in masculinization or feminization of fashion was found in proportion of jacket and proportion of trousers. This result indicated that a loose design was considered masculine for the female subjects. Design sense and overall image were also important factors in the evaluation of the masculinization or feminization of fashion.

Gender is an essential social topic today, and thinking and designs featuring empathetic design and designs showing emotion and cognition can better meet consumers' demands for masculinization or feminization in fashion. Revealing more diverse sex identities through fashion is a topic worthy of exploration in the future.

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