Research on kansei evaluation of women's closure collar suits

Min Yang[1,2*], Guo-Lian Liu[1,2]
[1]National Engineering Laboratory for Modern Silk, Suzhou, Jiangsu, 215021, (CHINA)
[2]College of Textile and Clothing Engineering, Soochow University, Suzhou, Jiangsu, 215021, (CHINA)
E-mail: 1063669321@qq.com

ABSTRACT

A behavioral test based on Kansei engineering was conducted in this paper to study the relationship between suit collar styles and the aesthetic of women's suits, as well as college students' perceptual cognition about women's closure collar suits from the cognitive psychology of consumers. Firstly, factors leading to style changes of collars were determined and classified, then series of pictures with different closure collars were drawn. 64 college students as subjects were tested by psychology software E-Prime. SPSS was used in this research to analyze aesthetic evaluation difference between different closure collar types by variance analysis. Finally, a optional female closure collar suit was found, which was the most professional style that college students liked most. Consumers' perceptual cognition of suits which was always difficult to measure was quantified in this paper, so that it became more easy to understand and grasp the perceptual demands of consumers. Conclusions of this paper can provide references for designers and manufacturers to design and produce women's suits that really satisfy the mental needs of consumers.

KEYWORDS

Women's suits; Closure collar; Kansei engineering; E-Prime; Variance analysis.

INTRODUCTION

Kansei Engineering is a consumer-oriented technology for product development based on Ergonomics and Computer Science, which is defined as "translating technology of a consumer's feeling (Kansei in Japanese) of the product to the design elements"[1]. With the continuous progress of human civilization, people pay more attention to aesthetics of clothes that can satisfy consumers' psychological needs rather than basic function of clothes. Emotional design methods can help designers better understand consumers' emotional needs of products and combine design elements with consumers' sensibility to design products which can meet emotional needs of consumers. While, it is useful to develop online clothing-shopping perceptual systems[2].

Female suits are evolved from European male suits, which are popular traditional styles among women's professional clothes[3]. Suits become one style of the required clothes for professional women because of their simple design, precise structures and excellent workmanship. Collars are crucial factors of clothing styles. Their position makes them become the focus of people's sight and feeling center of popular suits in a certain extent[4]. Notch lapel collars and closure collars are general suit collars. Closure collar suits are more special, because that they have both mature and classic features of notch lapel collar suits and elegant features of formal dresses, which make them noble. Variants of closure collars are very rich and different collars contribute to different suit styles, so that the emphasis of suit design should be placed on element combinations of collars. Closure collars were taken as research objects and psychological software E-Prime was used to conduct a behavioral test based on Kansei engineering knowledge in this paper. 64 college students worked as research subjects and their behavioral data were collected. Then variance analysis was used in this research to determine the optimal women' closure collar suit by SPSS. Conclusions of this paper will provide scientific references for designers to develop the aesthetic design of women' suits to meet customers' requirements.

EXPERIMENTS

Experimental materials

Determination of collar elements

Closure collars of female suits basically follow the shape features of male closure collars, namely that lapel collar angle and roll collar angle combine into a suture. The convergence of lapel and roll collar is like an arrow, so the closure collar is also known as "arrow collar"[5], as shown in fig. (1).
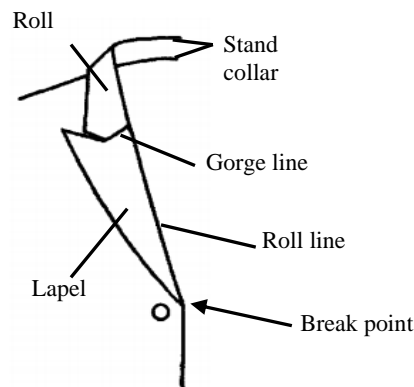

Figure 1: Structure of closure collar

Closure collar is constituted by many factors, such as notch, folding base point, break point, roll line shape, lapel lodging quantity and so on[6]. But it will increase the complexity of this research if all factors are considered. At the same time, there are some links between these factors, therefore we can summarize several key elements to research. Hong Lu thinks that neck depth, gorge line height and lapel collar width are important factors affecting collar styles[4]. Yi Liu and Fang Ma think that suit collar is associated with the direction of lapel, notch height and break point[7]. Based on the summary of research results of predecessors, collar elements are summarized as neck depth, gorge line position and neck width:

(1) Neck depth refers to vertical distance between side neck point and break point. Neck depth affects the number of buttons and the part of shirt exposed outside. Besides, it will appeal sight moving up or down.

(2) Gorge line position reflects the convergence and collocation proportion between stand collar and lapel. A gorge line higher than the standard position, namely that the proportion is very large, will lead to a carrying collar. On the other hand, with lower gorge line than the standard position, a sagging collar forms. Therefore, gorge line position has very important influence on the overall shape of closure collar.

(3) Neck width is equal to lapel width in this paper. The width of lapel directly affects the area and volume of roll collar and lapel, which is also very important to closure collar shape.

Setting grade difference for each element

Fang Qin has determined the best combination of suit length, waist and hem and obtained the optional basic suit style, as shown in fig. (2)[8]. On the basis of this, different suit styles were drawn in this paper by changing combinations of collar elements. According to Chen Ting's classification method of lapel collar elements, neck depth was classified into 6 grades and gorge line position was classified into 3 grades. Besides, neck width was classified into 5 grades[9]:

Figure 2: Optimal basic women suit

Grading of neck depth: female suit collar is generally open to the waist line, ranging from the hem line to the basic neck depth line (a horizontal line passing front neck point). Dividing the distance between basic neck depth line and waist line into 4 parts, the first bisector is grade 1 and the second bisector is grade 2. The third bisector is grade 3 and the waist line is grade 4. Then dividing the distance between waist line and hem line into 3 equal parts, the first bisector is grade 5 and the second bisector is grade 6. As shown in fig. (3).

Figure 3: Grading of neck depth

Grading of gorge line position: the distance between shoulder line (a horizontal line passing shoulder point) and break point is defined as neck depth. Gorge line should be located according to neck depth for the beauty of the overall shape. Dividing the distance between shoulder line and break point into 4 equal parts, the first bisector is grade 1 and the second bisector is grade 2. Besides, the third bisector is grade 3. As shown in fig. (4).

Figure 4: Grading of gorge line position

Grading of neck width: Neck width is equal to the width of lapel in this paper. Grading of neck width is based on the distance between side neck point and shoulder point, which is divided equally into 6 parts. From side neck point, the first bisector is grade 1 and the second bisector is grade 2. The fifth bisector is grade 5, and so on. The grading result of neck width is as shown in fig. (5).

Figure 5: Grading of neck width

Drawing sample pictures

After the difference determination of three elements, there are a totally 6*3*5 kinds of combinations. That is to say, 90 stimulating pictures of women's closure collar suits are drawn, which are encoded according to grade combinations of

three collar elements. Taking B3C1F4 as an example, B3 represents that neck depth is located in grade 3. C1 represents that gorge line location is located in grade 1 and F4 represents neck width in grade 4. To avoid influence of color and patterns on the perception of suit shapes, pictures of women suits are all drawn in black line and width of black lines are determined according to human vision. Black lines can separate contours from background and closed loops formed by these black lines are outlines of suits[8].

Determination of emotional evaluation words and index

Based on the previous study, "like" and "professional" are choose as emotional words to evaluate aesthetic sense of female closure collar suits. "Like" represents subjects' sense of preferences to a certain suit style and "professional" characterizes the professional feeling a suit brings to subjects. Subjects are required to give a score to a corresponding picture according to evaluation words appearing on the screen. Three-point scale is set in this paper. For the word "like", 1 point represents "dislike". 2 points represent "like". 3 points represent "like very much". When judging the sense of profession of a suit, 1 point represents "not professional". 2 points represent "professional". 3 points represent "very professional".

Subjects

According to <ISO-6658 General Methodology Guide>, in psychology experiments done by E-prime, data are reliable just when the number of subjects is 32 or above. So 64 college students of Soochow University (among them, 32 are males and others are females. 32 are major in clothing and others are not) are randomly selected as subjects in this paper and their ages ranges from 20 to 25 years old. All the subjects are willing to participate in the test and all subjects are right-handed.

Experiment procedure

Computers installed E-Prime 2.0 are used in this paper. Size of monitors is 17 inch and resolution is 1024*768 with 16 colors. A total of 90 pictures are used in this experiment, which make up 180 stimulation (each picture with two Kansei evaluation words).

Subjects sit in front of the computer. The distance between eyes to computer screen is about 60cm and visual angle is about 12.3°×4.9°. At the beginning of the experiment, "+" first appears in the center of the screen, which reminds subjects that the experiment begins. Sight of subjects should follow "+", then "like" or "professional" flashes in the center of the screen followed by a picture (stimulation picture). Subjects are required to mark the picture according to the word flashing before it based on their first impression[10-11]. If the score is 1, press "1" on the keyboard. "2" on the keyboard represents 2 points and "3" means 3 points.

Before formal experiments, there are 6 practice materials for participants to be familiar with the procedure and results of practices are not included in the final results. In addition, all pictures for formal experiments present in random orders. The experiment procedure is shown in fig. (6).
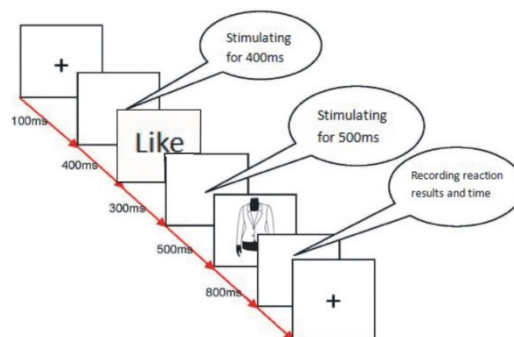

Figure 6: Diagram of experiment procedure

DATA ANALYSIS

Data required are integrated and output by E-studio after all tests finishes, which then are filtered by Excel 2007. Finally all data obtained are input into SPSS software for multiple analysis. Multi-factor anova of repeated tests is used to find the optimal collar.

Analysis on aesthetic difference

Multi-factor anova of repeated tests by SPSS is used to analyze 64 sets of data obtained from the experiment.

Sense of preference

TABLE 1. Variance analysis on preference

Source	F	Sig.
B	94.418	.000
C	84.680	.000
F	68.193	.000
B * C	2.646	.003
C * F	4.053	.000
B * F	1.109	.331
B * C * F	.920	.615

Results of variance analysis are as shown in table (1). Explain here that B*C means the interaction effects between depth(B) and gorge line position(C) and B*C*F means the interaction effects of the three factors. We can see that Sig. values of neck depth(B), gorge line position(C) and neck width(F) are all 0.000<0.01. That is to say, main effects of the three factors are significant on sense of preference. Interaction effects between B and C, C and F both reach to a extremely significant level. When interaction effects between two factors are significant, there is no need to analyze main effect of each factor (because the significance of main effect is not important in a practical sense). Instead, multiple comparisons of each combination means should be done to choose the optional combination[12].
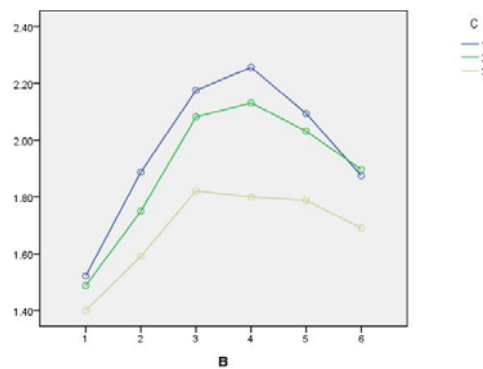

Figure 7: Interactions between B and C (preference)

As shown in fig. (7), 3 lines are not parallel to each other, namely that there are interaction effects between neck depth and gorge line position. When neck depth is in grade 4 and gorge line position is in grade 1, the evaluation score of closure collar is highest.
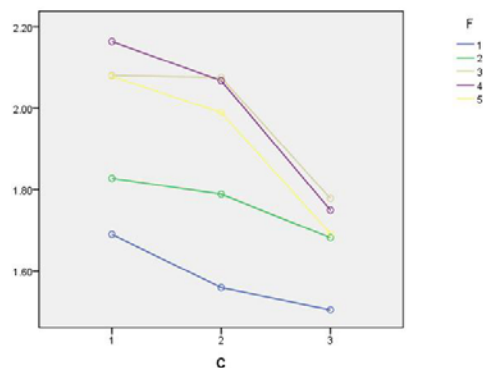

Figure 8: Interactions between C and F (preference)

5 lines in fig. (8) are not parallel to each other, which indicates the existence of interaction between gorge line and neck width. When gorge line position is located in grade 1 and neck width is located in grade 4, the closure collar gets the highest score about sense of preference.

Sense of profession

TABLE 2. Variance analysis on profession

Source	F	Sig.
B	75.271	.000
C	67.217	.000
F	63.421	.000
B * C	2.686	.003
C * F	4.380	.000
B * F	.763	.761
B * C * F	.992	.484

Results of variance analysis on sense of profession are as shown in table (2). Sig. values of three main effects are 0.000<0.01, indicating that main effects of the three factors are significant on the sense of profession. Interaction effects between B and C, C and F both are significant.
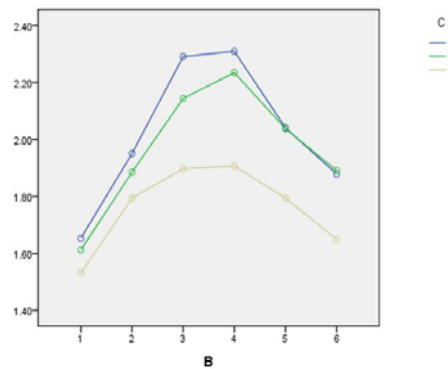

Figure 9: Interactions between B and C (profession)

We can see from fig. (9) that 3 lines are not parallel, indicating that there are interaction effects between neck depth and gorge line position. When neck depth is in grade 4 and gorge line position is in grade 1, closure collar gets the highest score about sense of profession.
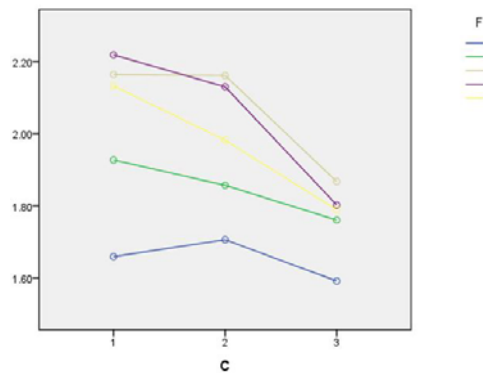

Figure 10: Interactions between C and F (profession)

As shown in fig. (10), 5 lines are not parallel to each other, that is to say, the interaction effect between gorge line and neck width is significant. When gorge line position is located in grade 1 and neck width is located in grade 4, the evaluation result of profession is at the highest point.

According to analysis results above, B4C1F4 is the factor combination that people like most and it is also the most professional suit style, as shown in fig. (11). At this time, neck depth is in grade 4. Gorge line position is in grade 1 and neck width is located in grade 4.

Figure 11: Optional female closure collar suit

CONCLUSIONS

The relationship between closure collar styles and aesthetic sense of female suits based on kansei engineering was studied in this paper. The experiment is done by E-prime and we can drawn some conclusions as following:

(1) Main effects of the three factors are extremely significant both on sense of preference and profession. Namely that they have significant influence on aesthetic evaluation of female closure collar suits. Interaction effects between B and C, C and F both reach to a extremely significant level both on sense of preference and profession.

(2) B4C1F4 is the most professional female closure collar suit that college students like most.

With the development of society, young people are affected by the external and open thoughts, which contributes to their acceptance of female suits with bigger and wider lapels and collars opening larger. It can be said that it is easier for modern youth to accept more fashionable suits. Manufacturers are suggested to produce suits targeting at young people to meet their psychological needs. Conclusions of this paper can provide quantitative references for designers to design more popular suits and enrich clothing psychology theory. So that suit styles can really cater to consumers' tastes.

In further research, the influence of subjects' sex difference and major difference on aesthetic evaluation will be analyzed. More subjects should be involved in the test and a mathematical model could be established to calculate sense of preference and profession of female closure collar suits.

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