The Elements and Sustainable Innovative Design of Button Knots in the Period of Republic of China

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Abstract. Button knots craftsmanship is on the verge of extinction because it is not in line with modern life. This paper firstly applies literature review and field investigation to summarize the shapes, knot-applied parts and materials as three key elements of button knots in the period of Republic of China. Secondly, the paper innovatively designs the button knots from the perspective of sustainability. Furthermore, the paper analyzes the innovation application of button knots in modern design through peer review and questionnaire, which shows inheritance and innovation of button knots design. The shape innovation of button knots with the concept of inheriting Chinese traditional culture or caring for the environment, the innovation of knot-applied parts at the belt or chest of the clothing, the material innovation of button knots with natural materials such as cotton, linen, silk and wool or new environmentally friendly materials are all possible paths for future sustainable design in button knots.

1. Introduction
The Button knot is made by hand winding the finished strip into various shapes, which is mainly used in traditional Chinese costume to fix the placket and used as a kind of decoration. Button-knot-style costume is the main type of costume placket closure system in the period of Republic of China (RC hereafter). The author of this paper visited Shanghai Textile and Apparel Museum, Chinese Silk Museum, Shanghai History Museum, and Mr. Jiao Yigang, the fourth generation descendant of Longfeng Qipao to study on the development and current status of RC button knots.

Furthermore, based on interviews with fashion engineering professors in Donghua University and from the perspective of sustainable design, this paper designed the questionnaire of “Innovative application of button knots in modern design”. The respondents of the questionnaire are those engaged in the art industry, such as designers, photographers, art teachers, etc. This questionnaire was distributed online with a valid return of 136 (a validity of 90.7%), with the aid of Likert 5-point scale and SPSS in order to achieve the purpose of inheritance and innovation button knots in modern design.

2. An analysis of Elements of Button Knots in the Period of Republic of China
Based on the methods of literature analysis, field investigation and expert interview, this paper categorizes RC button knots elements into shapes, knot-applied parts (“parts” hereafter), and materials as three key elements, and summarizes the specific characteristics of the RC-button-knot elements by analyzing 120 lady’s wear. (See Table 1)
Table 1. Button-knot Elements and Characteristics in the Period of Republic of China

| Button-knot Elements | Characteristics |
|----------------------|-----------------|
| Shapes               | Geometric shape, Animal and plant shape, Chinese characters shape |
| Parts                | Collar, Placket, Hem, Cuff |
| Materials            | Cotton, Flax, Silk, Wool, Knot of button knot is Gold, Silver, Diamond, Jade |

2.1. Shape

The structure of button knots is composed of three key parts: knot of button knot (KBK), loop of button knot (LBK), winding pattern of button knot (WPBK). (See Figure 1)

![Figure 1. Structure of button knot](image)

This paper selects some real objects that can represent the evolution of RC button knots. From the research of real objects, the button knots are delicate in shape, and the creative inspiration mostly comes from nature of and desire for happiness, well-being, and auspice, to achieve great artistic value.

Table 2. Categories of RC-button-knot Shapes

| Shapes                     | Real object | Line sketch | Real object | Line sketch | Real object | Line sketch |
|----------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Geometric Shape            | ![Image](image) | ![Image](image) | ![Image](image) | ![Image](image) | ![Image](image) | ![Image](image) |
| Animal and Plant Shape     | ![Image](image) | ![Image](image) | ![Image](image) | ![Image](image) | ![Image](image) | ![Image](image) |
| Chinese Characters Shape   | ![Image](image) | ![Image](image) | ![Image](image) | ![Image](image) | ![Image](image) | ![Image](image) |

This paper divides the shapes of RC button knots into three types: Geometric, Animal and plant, Chinese character. (See Table 2) [2]

Geometric shape button knots refer to straight button knots, round button knots and square button knots, etc. The straight button knot is the most common and easy to be made. One button knot strip is made into a ball-shape KBK, and the other into a straight LBK. Round button knot is also a common type. When making a round button knot, the WPBK should be wrapped evenly as much as possible, so that the button knot’s shape will be beautiful.
Animal and plant shape button knots refer to bionic button knots, such as flower patterns, gourd patterns, lute patterns, etc., whose WPKB can be designed into various animal and plant shapes, so that they can express human's longing for the beautiful things in nature.

Chinese character shape button knots refer to longevity, auspice, and happiness button knots which express human's wishes for health and happiness. The animal and plant shape and Chinese character shape button knots generally need to put thin copper wire in the button knot’s loop for convenience of setting.

2.2. Knot-applied Part
The button-knotted costume was the main type of costume for placket closure system in the period of Republic of China. This paper analyzes 120 lady's wears at that time to prove that the button knots are generally applied at the collar, placket, hem and cuff. For robe, the number of button knots on the stand collar is generally 1-3. Mr. Jiao Yigang of Longfeng Qipao said: “Except for the button knots on the stand collar, the button knots on the placket and hem are generally in odd numbers.” In 1936, LIN LOON MAGAZINE described, “There are 2-3 button knots on the neck of the robe, and 11-13 from the placket to the hem.” It is found that the button knots on the robe placket and hem in the period of Republic of China are basically in odd numbers. The early years of the Republic of China witnessed the coexistence of function and decoration in button knots. In the 1920s and 1930s, the decorative features became more salient; the button knots at that time became an important means of decorating costume.

2.3. Material
Through analysis of lady's wear in the period of Republic of China, it is found that the materials of RC button knots are basically the same as the clothing. It is mainly made of the natural materials of cotton, linen, silk and wool. Sometimes the KBK is made of gold, silver, diamond and jade, which shows the high value of the clothing.

3. An Analysis of Innovation Elements of Button Knots with Modern Design
In modern times, the button knots design is currently in blind pursuit of a variety of shapes. From the perspective of sustainable design, this chapter analyzes the key innovation elements of button knots—shapes, parts and materials, hoping for the presence of button knots in people's spiritual world through sensory design, so that the button knots design resonates with the mood of consumers. Peers review that the innovation elements of button knots are shapes, parts and materials from high to low. 87.5% of peers choosing “shapes innovation” is important and very important. (See Table 3)

| Innovation Elements | Least important | Less important | Neutral | Important | Very important |
|---------------------|----------------|----------------|---------|-----------|----------------|
| Shapes              | 2.94%          | 4.41%          | 5.15%   | 43.38%    | 44.12%         |
| Parts               | 2.21%          | 2.94%          | 11.03%  | 40.44%    | 43.38%         |
| Materials           | 0.74%          | 3.68%          | 16.18%  | 38.97%    | 40.44%         |
| Totals              | 1.96%          | 3.68%          | 10.78%  | 40.93%    | 42.65%         |

3.1. Innovation of the Shapes
Peer review shows that the proportion of “Important” and “Very Important” in “design concept of inheriting Chinese traditional culture” is 97.06%, which is significantly higher than other design concepts in total, and other elements of design concept from high to low are environmental protection, animal protection and sustainable use of resources. Therefore, the innovation of button knots with modern design can start with the specific concepts of sustainable designs such as the protection of traditional Chinese culture and care for the environment, and then convey the concepts through the intuitive and concrete design elements of button knots. For example, the design of shape inspired by the
Taotie decoration of Chinese ancient bronzeware conveys the concept of protecting traditional Chinese culture; the design of shape inspired by the China's national treasure giant panda conveys the concept of caring for the environment and protecting endangered animals. (See Table 4)

**Table 4. Peer Review of Design Concept of Shapes**

| Design Concept of Shapes                  | Least important | Less important | Neutral | Important | Very important |
|-----------------------------------------|-----------------|----------------|---------|-----------|----------------|
| Take care of animals                    | 3.68%           | 2.94%          | 21.32%  | 27.21%    | 44.85%         |
| Take care of environment                | 3.68%           | 3.68%          | 16.91%  | 27.94%    | 47.79%         |
| Inheriting Chinese traditional culture  | 1.47%           | 0%             | 1.47%   | 23.53%    | 73.53%         |
| Sustainable use of resources            | 1.47%           | 2.21%          | 19.12%  | 33.09%    | 44.12%         |
| Totals                                  | 2.57%           | 2.21%          | 14.71%  | 27.94%    | 52.57%         |

3.2. Innovation of the Knot-applied Parts

Peer review shows that the sums of “Agree” and “Extremely Agree” on the use of button knots at the belt and the chest of clothes account for 81.61% and 79.41% respectively, so that peers agree more on the use of button knots in lady’s top wear. (See Table 5)

**Table 5. Peer Review of Knot-applied Parts**

| Parts    | Extremely disagree | disagree | Neutral | Agree   | Extremely agree |
|----------|--------------------|----------|---------|---------|-----------------|
| Chest    | 0.74%              | 2.21%    | 17.65%  | 44.12%  | 35.29%          |
| Belt     | 0%                 | 5.15%    | 13.24%  | 49.26%  | 32.35%          |
| Skirt    | 0%                 | 5.15%    | 24.26%  | 46.32%  | 24.26%          |
| Pants    | 0%                 | 7.35%    | 26.47%  | 46.32%  | 19.85%          |
| Shoes    | 1.47%              | 6.62%    | 22.06%  | 43.38%  | 26.47%          |
| Totals   | 0.44%              | 5.29%    | 20.74%  | 45.88%  | 27.65%          |

Changing the knot-applied parts is one of the ways of sustainable design. The innovation of parts makes designers consider how to make consumers reuse button knots when they decide to discard them. For example, the size of button knots can be enlarged, even to more than ten times. The original implicit and restrained characteristics of the button knots can be replaced by an exaggerated decoration method, making the button knots of more visual impact. In addition, fixing the enlarged button knots on the waist or chest makes the button knots the finishing touch of modern fashion design. (See Figure 2)

**Figure 2. The Knot-applied Parts of Button Knots Innovation**

3.3. Innovation of the Materials
Peer review shows that the traditional natural fibers such as cotton, linen, silk and wool are the preferred materials; Then, from the concept of sustainable design, new environmentally friendly materials, recycled materials and waste materials can be used. (See Table 6) In addition, in the face of the growing problem of waste materials, we can explore how to reuse a large number of clothing waste.

| Materials                                | Extremely disagree | disagree | Neutral | Agree | Extremely agree |
|------------------------------------------|--------------------|----------|---------|-------|-----------------|
| Cotton, hemp, silk, wool                 | 0%                 | 1.47%    | 10.29%  | 41.91% | 46.32%          |
| New environmental protection materials    | 0.74%              | 0%       | 5.15%   | 49.26% | 44.85%          |
| Waste materials                          | 2.21%              | 6.62%    | 25%     | 36.76% | 29.41%          |
| Recycled materials                       | 1.47%              | 2.94%    | 12.5%   | 42.65% | 40.44%          |
| Totals                                   | 1.1%               | 2.76%    | 13.24%  | 42.65% | 40.26%          |

4. Conclusion
The button knot is small, but it expresses the Chinese yin-yang philosophy, and also expresses people's longing for the beautiful things of nature and prayer for a happy life. Therefore, it bears a strong heritage of traditional Chinese culture. Button knots in the period of Republic of China experienced an evolutionary process from function to decoration, from simple shape to rich shape.

Based on the analysis of innovative application of button knots with modern design, this paper draws the following conclusions. In design concept of shape, inheriting Chinese traditional culture and caring for the environment are of the greatest importance; in knot-applied parts, button knots are most appropriately fixed on belt and chest; the best materials are natural materials such as cotton, linen, silk and wool as well as new environmentally friendly materials. In all, an integration of these three elements contributes to inheritance and innovation of button knots in modern design.

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