

Human Factors Perspective of Dancing Props Design: A Case Study of “Feiyan’s Dancing on Palms”

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Abstract. “As light as a swallow” is considered as a standard of aesthetic interpretation in female body figure in contemporary world. What the “swallow” really represent is the famous dancer Zhao Feiyan in Han dynasty in China. According to the literature, she is good at a kind of chinese Kung Fu. She was able to dance on the palms of man. Two dancing pieces “Dancing on palms” (1996) and “Feiyan’s dancing on palms” (2010) were created by the author previously. In order to reshape a historical character being so familiar to the general public, how to profile a vivid appearance and personality was the main concern. The fulfilment of this task relied on a profound exploration of the scenario including historical background, social context, and cultural phenomenon. The costume further played an additive role in the process of choreography. According to the historical record, the Emperor Chen of Han (51-7 BC) also made a special “crystal plate”. The dancer Zhao Feiyan can dance on the crystal plate which the assistants held. To have a better performance and safety concern, several human factors about the costume including material quality, make-up method and surface area are another important issues. In order to present the images in artwork “Feiyan’s dancing on palms,” many factors should be considered in the process of choreography. For example, the material quality of “crystal plate” including its thickness, weight and surface area; the choice of dancers to fulfill the character (the type of build, ability of dance, stage manner); an appropriate music for the dance (form, rhythm, style). After considering the human factors in the design of “crystal plate”, it also solved the problems in the make-up of dancing props. The original idea and design of the author could be well presented on the stage.

Keywords: Zhao Feiyan · Dancing on palms · Props design

1 Introduction

The Han dynasty is a critical era that contributed to the development of Chinese dance, and one that laid a solid foundation for related developments and achievements in later generations. Zhao Feiyan, a talented and well-known elite dancer during the Han dynasty,

was able to become a queen by using her superb dancing skills. Her achievements, particularly the one in which she was able to dance “as lightly as a swallow,” has had a profound influence on the development of dance performed by people in later generations.

In 1996 and 2010, the researcher of this study participated in the choreography for annual dance performances, *Record of Chinese Dance Styles* and *40 Years of Chinese Dance*, delivered by the Department of Dance, National Taiwan University of Arts. The dances in the two performances were designed in an attempt to pass the art of traditional Chinese dance, one that embodies a wealth of Chinese culture, onto the public. The historical record of Zhao Feiyan dancing on palms (Fig. 1) was selected as the theme of the choreography to display Zhao Feiyan’s graceful, bird-like gestures to pay tribute to this ancient dance. Therefore, the dance works for the two annual dance performances were named *Dancing on Palms* in 1996 and *Feiyan’s dancing on palms* in 2010. In addition, new aesthetic interpretations of the dances were introduced to showcase a modern version of a female dancer in Han dynasty.



Fig. 1. Dancing on Palms. Source of data: *A Story of Ancient Dancers*, by Wang Ke-fen (1986: p. 60) [10]

2 Research Objectives

In the present study, an ex post facto method was adopted to analyze the process of choreography, in which stories of historical figures were used as themes for dance creation and dancing props were used. This study was grounded on hermeneutics and visual culture theories [1–5, 7]. The focus was on the dancing prop design that adopted human factors engineering for the choreography of *Feiyan’s Dancing on Palms*.

Specifically, this study investigated the design and production of “crystal plates” and the choreographic practices in which these special dancing props were used.

The techniques for performers to control the crystal plates (which included dancers dancing on the crystal plates, as well as performers holding the crystal plates) were also examined, to highlight the theme of the dance work. Subsequently, efforts were made to discover methods for realizing the aesthetic imagery of the dance in the performance of *Feiyan’s Dancing on Palms*. The objectives of this study are as follows:

1. To conceive a human factors perspective for unique dancing prop design to allow dancers to display their body movements and deliver flawless performances while their safety is protected;
2. To represent the artistic talents of ancient Chinese dancers by using historical records as themes for the creation of dance performances;
3. To enrich the artistic expressions of dances and transform classic, historical stories into dance performances, as well as to transmit and promote Chinese culture by using contemporary art and aesthetic theories; and
4. To supplement professional dance theory-related courses (e.g., history of Chinese dance, appreciation of the art of dance, and dance criticism) with visual mediums (e.g., dance videos) to facilitate learning effectiveness.

3 Unique Characteristics of the Dance Work

The unique part of *Feiyan’s Dancing on Palms* was how Zhao Feiyan (portrayed by the dancer) was able to dance and walk gracefully between the crystal plates suspended in the air. However, the dance should not be viewed as a type of stunt; the beauty of the dance lies in the themes and human emotions being conveyed, as opposed to a special type of dancing skills being shown off. Therefore, as Zhao Feiyan was absorbed in the graceful movements of the body, the performers holding the crystal plates was fixated on the process of coordinating with one another (e.g., movements of the feet and controlling the part of their arms that was carrying the weight of the crystal plates); both parties were faced with an enormous amount of psychological pressure.

For the dance choreography that used Zhao Feiyan and the crystal plates as themes, the focus was put on creating clear images and a personality for Zhao Feiyan, obtaining and using the crystal plates, and creating onstage dance performances by using information found in historical records.

4 Factors to Consider in Dance Choreography

The growing popularity of visual culture research in recent years has expanded visual culture from popular culture to the fields of art history and everyday life [3]. According to English scholar Rogoff (1998), the purpose of visual culture is to develop the eye of a critic to reexamine the approaches by which people see their world and the history that is represented [9].

In the interpretation of *Feiyan's Dancing on Palms* centering on the main character of Zhao Feiyan, in addition to examining the refined and aesthetic qualities of the dance, this study sought to adopt the visual culture perspective, particularly focusing on the role of women that generates conflicts and confrontations in social class consciousness, to analyze the original meanings and the implications of the visual signs presented in this dance work.

Jacques Maquet (1988) in his book *The Aesthetic Experience* indicated that the following four secondary signs take on visual forms: referents (signs by reference), indicators, images, and symbols. In particular, images refer to visual duplicates of people, objects, sceneries, and anything with a form that can be observed [8]. To better understand the images of Zhao Feiyan as “being as light as a swallow and able to dance on the palms of man,” historical books were studied to learn about objective factors related to her; these included the historical background, living environment, her personality traits, and her thoughts and feelings.

Portraits of Han dynasty women drawn by painters were also collected to enrich the knowledge of the choreographer in the creation of the dance, who was enabled to construct images identical to those produced in the past. Another crucial topic of concern involved the search for crystal plates made from suitable materials, on which performers could showcase their dancing skills, followed by the selection of appropriate styles of music to create an atmosphere that effectively depict the mood of the dance. The objective was to construct images, a sign described by Maquet, which are composed of visual duplicates including Zhao Feiyan (people), crystal plates (objects), music (sceneries), and tangible objects that can be observed in the external world.

In the performance of *Feiyan's Dancing on Palms*, crystal plates were held high on stage by performers with a strong physique and superior muscular endurance. During the 1996 performance (*Dancing on Palms*), four male dancers were chosen from the Department of Dance, National Taiwan University of Arts to hold the crystal plates. For the 2010 performance, a new, modern visual culture perspective was adopted for the choreography of *Feiyan's Dancing on Palms*, in which a total of eight male dancers were selected to hold two crystal plates that differed in size.

The interdependence between the male dancers and the crystal plates, and the way that they complemented each other, further enriched the role of crystal plates as dancing props and metaphors. In addition, the body performance of the male dancers holding the crystal plates (Fig. 2) was deliberately showcased to exhibit their masculinity, which created a stark contrast with the submissive and graceful gestures of Zhao Feiyan (Fig. 3), to highlight the difference in gender roles between men and women.

Concerning the setup and use of the two crystal plates (Fig. 4), they were used to create a fourth dimension on the stage. In general, dancers performing on stage deliver 2D performances; by having dancers stand on the crystal plates and dance, a 3D performance can be delivered. The reason why another crystal plate was added in the 2010 performance of *Feiyan's Dancing on Palms* was to enable Zhao Feiyan to change her locations on stage, thereby constructing a 4D performance. The two crystal plates were separated, united, stacked, placed in various layers and at various heights to engender an illusory effect, symbolizing that Zhao Feiyan attempted to break free from the existing temporal and spatial confinement but was still unable to escape from the crystal plate prison built by the king (Fig. 5).



Fig. 2. Display of masculinity



Fig. 3. Image of female submissive and graceful



Fig. 4. Use of the two crystal plates

To display the imagery of *Feiyan's Dancing on Palms* in actual forms, numerous factors must be considered during the art creation process, such as selecting props with appropriate properties (i.e., thickness, weight, and surface area) as the crystal plates, dancers with appropriate attributes (i.e., type of build, ability to dance, and stage manner) for Zhao Feiyan, and dance music with appropriate qualities (i.e., form, rhythm, and style). These three factors must be able to work together and supplement each other to drive the performance. Moreover, the human factors were considered for the design of the crystal plates as they play a pivotal role in *Feiyan's Dancing on*



Fig. 5. Crystal plates symbolizing the prison

Palms. By adopting human factors engineering, problems relating to dancing props were resolved, and the original ideas and design concepts were realized.

5 Human Factors Considered in Props Making

Dances were created primarily to convey themes, express emotions, and engage the senses. The crystal plates, as described in historical records, served as a pivotal subject in *Feiyan's Dancing on Palms*, because the images of the crystal plates were one of the key factors contributing to Zhao Feiyan's prominence in the development history of Chinese dance. To ensure the safety of the performers holding the crystal plates, human factors had to be considered when designing such props to achieve performances that were complete and flawless.

In general, for objects to achieve the predetermined effect, they must rely on the actions of the people operating them (i.e., movements made by the joints, strength exerted by the muscles, and feelings perceived by the senses) [11]. The same principle applies to props used in the field of dance. In human factors engineering, the subject of object control is studied in the domain of biomechanics research. The control of dancing props is limited by the physical limits of the dancers, the weight of the props, and the width of handles for grabbing, which are key factors that influence dancers' control of objects. Therefore, the biomechanics (i.e., the physical limits of humans), the weight of the props, and the width of the handle were crucial factors that must be simultaneously considered in the dancing prop design. Regarding the critical factors that influenced the display of the imagery of "Feiyan's Dancing on Palms" in actual forms, dancer selection and props selection, which were mutually influenced, were proposed and are explicated in the following sections.

5.1 Selection of Dancers

To present the imagery of *Feiyan's Dancing on Palms* in actual forms and to bring life to the dancing scenes as recorded in historical sources, the dancer portraying Zhao Feiyan must have the appropriate type of build, ability to dance, and stage manner. These were the criteria considered during the dancer selection process.

5.1.1 Suitable Type of Build

Because the diameter of the crystal plate measured only 150 cm, maintaining balance on the small surface area was challenging. In addition, the psychological fear of falling that prevented dancers' central nervous systems from effectively maintaining their balance severely jeopardized the results of the performance. Therefore, dancers measuring approximately 150 cm in height and 45 kg in weight were the best candidates to play Zhao Feiyan (Fig. 6).



Fig. 6. Zhao Feiyan dancing gracefully on the crystal plates

5.1.2 Strong Ability to Dance

The ability to dance gracefully is a skill that cannot be quickly learned; it is acquired through years of practice. To become an outstanding dancer with a solid dancing foundation, a person needs to possess basic dancing abilities, undergo substantial training, invest great efforts into acquiring related professional knowledge, and maximize their creative potential (Fig. 7).

5.1.3 Superior Stage Manner

Dancers who participate in performances are inevitably subjected to pressure, which leads to psychological anxiety. This pressure is also a byproduct of them demanding the best from themselves. Therefore, dancers must possess a calm and stable mind to be able to deliver superior performances on stage.



Fig. 7. Zhao Feiyan showcasing her solid dancing ability and excellent stage manner

5.2 Selection of Props

The crystal plates were the primary props used in the dance. The materials used to make the crystal plates, the hardness and sizes of the props, and the design and production processes are described as follows:

5.2.1 Materials

Although crystals give people the impression of something that is crystal clear and glitters, they are expensive and difficult to obtain. Considering the high cost and poor practicality of crystals, acrylics (an item that is also transparent) were used as a replacement.

5.2.2 Hardness

Although crystal is hard regardless of thickness, they are brittle; in contrast, acrylics are more resilient. However, the hardness of acrylics is directly proportional to its thickness, and it is heavier than crystal. Therefore, when assessing the hardness and weight of the acrylics to be used, the weight of the dancer playing Zhao Feiyan must also be considered to ensure that the sum of their weight is one that can be sustained by the performers holding the crystal plates (each crystal plate is held by four performers). The thickness of the acrylics thus was determined after considering the safety of the performers.

5.2.3 Size

Because the crystal plates were a minimized version of the actual stage, to enable the dancers to dance gracefully on them, the surface area of the crystal plates must be sufficient. This was because crystal plates suspended in the air and featuring an overly small dancing area would lead to difficulty in maintaining balance and that the psychological fear of falling would jeopardize the performance.

Although an increase in the surface area of the crystal plates would allow dancers to have more room to operate, the added weight would create an additional burden on the performers holding the crystal plates. Therefore, the sizes of the crystal plates were determined after the demands of the two parties were carefully considered, providing dancers with enough room to move and change positions.

After taking into account the factors involved in the choreography, the safety of the dancers, and various aspects of concern, two crystal plates made from acrylics of varying sizes were used. The first crystal plate measured 1.8 cm in thickness and 150 cm in diameter; the second crystal plate measured 1.5 cm in thickness and 100 cm in diameter. These crystal plates featured a surface area and weight that were deemed to be appropriate and safe, and they enabled Zhao Feiyan to showcase a graceful dance performance. The two crystal plates were separated, misplaced, and stacked to create a variety of images and to make movements and dances on the crystal plates visually pleasing to watch.

6 Analysis and Review

For the performance of *Dancing on Palms* choreographed in 1996, only one crystal plate was used. The original idea was to employ three performers to hold the crystal plates to create a more visually pleasing view. However, after considering the safety of the female dancers, as well as the physical conditions of the performers holding the crystal plates (i.e., to prevent them from shoulder injuries and pushing beyond their physical limits), an additional performer was added.

For the performance of *Feiyan's Dancing on Palms* choreographed in 2010, two crystal plates that varied in size were used. The skillful control of the crystal plates and the elegant body movements of the performers successfully supplemented each other and enhanced the richness and tension of the performance, in terms of both the external presentation of the dance and the implications hidden within.

As stated by Susann Langer (1957), a renowned American scholar who studied semiotics and aesthetics, art is created in the form of symbols to express human emotions [6]. Props are stationary objects and only come to life when beautiful dances come together with skillful prop control. These props work in harmony with the dancers, supplementing each other to create enriched and colorful dance images. They allow the creation of dances to achieve new heights and enable the audience to be satisfied with the magnificent visual performances and the interpretation of the connotations involved in the dance work.

7 Conclusions and Recommendations

Dance is a form of expression in which the body moves to create postures; it is also a way of expressing thoughts and emotions through rhythmic movements. Dances are a space-oriented art, as well as a time-oriented art. They must be performed in front of an audience, in which the audience experiences the emotions depicted and then comprehends and appreciates the art embedded in the performance.

7.1 Conclusion

During the choreography process for *Feiyan's Dancing on Palms*, to ensure the effective display of the refined and aesthetic qualities of the art work, artifact records and historical data from the Han dynasty were carefully studied. The records and data were abundant, from which the life stories of Zhao Feiyan were examined to find ideas for creating the dance.

Dancers are the subjects in dance performances; therefore, the dancer with appropriate dance skills and who matched the appropriate image of Zhao Feiyan was selected. The usage of the dancing prop, the historically renowned crystal plates, was also integral to the dance. The making and use of the crystal plates presented challenges to the choreographers and the performers (including the female dancer standing on the suspended crystal plates and the male performers holding the crystal plates) during the dance creation and performance processes.

In addition, appropriate music had to be chosen from a large selection of available music. These were the factors that must be considered to produce the dancing images of Zhao Feiyan, for these images to be imprinted in the minds of the audience, and to enable choreography theories to be applied in practice.

7.2 Recommendations

Traditional dances in Taiwan are characterized by the repeated use of props. The wide variety of props available has resulted in various usage methods and operational skills. Choreographers use their artistic prowess to connect dancing props to dancers, which therefore can work in harmony with each other to create enriched and colorful dance images. Thus, the creation of dances can achieve new heights, enabling the audience to enjoy the magnificent visual performances and to interpret the connotations implied in the dance work.

An ex post facto self-interpretation methodology was adopted in which an objective perspective was employed to perform an in-depth analysis and self-reflection on *Feiyan's Dancing on Palms*. The result may be used as a reference for subsequent choreography of dance works in an attempt to perfect the performances. The recommendations are as follows:

1. The use of dancing props as symbols primarily focuses on the successful presentation of the dance content. Choreographers concerned with results of the performances must first pay attention to the props (i.e., the crystal plates), as well as the psychological state of the performers (i.e., female dancer standing on the suspended crystal plates and male dancers holding the crystal plates). The ability of dancers to convey emotions through props relies on their mastery of prop control and how well they can dance on and with the crystal plates. Because no shortcuts exist for dancers to become skilled at their craft, they must constantly practice;
2. Concerning the use of the crystal plates, male dancers must possess sufficient physical strength and determination to support the plates; female dancers must overcome the fear of falling and maintain balance on the narrow platform; and choreographers must consider the safety of the dancers in the design of dances; and
3. To produce good dance performances, dancers must not only possess perfect dancing skills but also have a thorough understanding of Chinese culture and the ability to express emotions. To enrich the performance skills of dancers, choreographers must educate dancers on the aesthetics of culture and arts, which should not be ignored in dance education.

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