Tradition Upgraded, Intangible Cultural Heritage Redefined through Innovation:
The Case of a Kunqu Opera Costume Redesigned with Kinetic Functionalities

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Introduction

The rich heritage of performance in China, listed in UNESCO programs and surpassing any other country on the planet (Lu et al. 2022, 7), plays an important role in today's diversified economy and has impacts on touristic potential of many cities. Yet the continuous development of contemporary entertainment offerings, changes in the audience's taste, and accessibility of shows through a diverse range of media all are fostering the rebirth of certain classic genres but also threating the preservation of their foundational features (Iovene 2010, 191).

The six hundred years of the history of Kunqu have alternated between periods of splendor and of shadow. Although recent decades have seen a major recognition of its importance for Chinese culture, Kunqu was initially born for the elites in the city of Suzhou in the eastern province of Jiangsu (Wang 2019, 60).

Kunqu suffered during the Cultural Revolution of the 1960s and 1970s for lack of funding and from competing ambitions of a state-owned system (Wichmann 1990, 167). Kunqu opera then required a "diaspora" of Taiwanese Chinese (Zhao 2020, 24) and two UNESCO proclamations (listing as a masterpiece of the Oral and Intangible Heritage of Humanity by UNESCO in 2001 and inclusion as a Masterpiece of the Intangible Cultural Heritage of Humanity in 2008) to resurge from the threat of slowly disappearing.

Beside the opera, a whole range of artisanship and skills exists that, without government support and the efforts of dedicated patrons, could slowly disappear forever. Yet despite its potential to become an experience that could attract tourism to its place of origin, Suzhou and the other "water towns" along the lakes and canals of Jiangsu, Kunqu performances,

Mimesis Journal, 13, 2 | 2024, pp. 413-420 https://doi.org/ 10.13135/2389-6086/10087
ISSN 2279-7203

curiously, are seldom exhibited in public. Public shows would promote a healthy perpetuation and awareness of its cultural importance, but performances are still enjoyed mostly by an elite of connoisseurs behind closed doors of dedicated theaters. Other characteristics that limit its appeal to a broad audience include use of a difficult dialect, its virtuosic vocal pitches, and the length of its performances, which were initially written to last several hours if not several days.

Kunqu was born for the Ming dynasty elites, and even if nowadays this genre is well known to the general public, only a few of the educated and wealthy can enjoy its exquisite ensemble of music, drama, singing, stunts, and elegant costumes, all in a minimal setting (Lévy 2005, 425). This becomes even more evident when comparing Kunqu to Pingtan, another artform that also developed in Suzhou, which enjoys popularity as a more accessible and entertaining form of performance, especially within its region of origin. Pingtan performances are simple, usually involving only two performers, one singing and the other playing an instrument like the pipa or sanxian. It is a popular form of entertainment that can be easily enjoyed by a range of audiences.

Another element that characterizes Kunqu opera is the costumes used in its performances. They are made with the highest level of traditional crafts, referencing Ming dynasty (1368 – 1644) clothing, and enriched by fine hand-embroidery techniques. It takes months to complete a single costume through the dedicated effort of skillful artisans who pass their knowhow through generations. Suzhou is among several areas known for the production of excellent textiles and originated one of the finest embroidery techniques. Silk textiles have been woven in Suzhou since the establishment by the imperial court of a government-run weaving and dyeing bureau. By the mid-eighteenth century, the Qing imperial weaving and dyeing offices in Suzhou and other nearby cities employed thousands of artisans, which indicates the enormous scale of local production (Fromental 2017).

The author also recognizes that several writers undertook initiatives to innovate Kunqu opera. One of the most notable is contemporary novelist Pai Hsien-yung's Young Lover's Edition of Tang Xianzu's classic *Peony Pavilion*, whose goals are to "give new life to the artform, cultivate a new generation of Kunqu aficionados, and offer respect to playwright Tang and all the master artists that came before." (Academic Dictionaries and Encyclopedias, 2024). Although it is not this author's ambition to compete with such a profound and impactful venture, the project described below also derives from *The Peony Pavilion* but addresses the necessity of sparking

a dialogue among crafts and manufacturing in an environment, contemporary China, still struggles to find a proper cultural and philosophical balance for them.

Methods

To explore the possibilities and ways of innovating Kunqu opera costumes, a series of actions has been undertaken to build a network to support the project's development. The postgraduate module named "Transdisciplinary Methods for Design" at XJTLU Design School in Suzhou was the initial spark to engage with a selected cohort of talented students on the topic, introducing them to various disciplines connected to Kunqu and Chinese opera in general.

Figure 1. One of the several precious antique costumes from the late Ming Dinasty, preserved at Sizhi Cultural Development carefully handled by the founder (Parati 2023)

The activity pivoted on collaborating with Bin Zhang, a renowned opera costume designer and founder of Sizhi (Suzhou) Cultural Development. Figure 1. Bin is an artist, entrepreneur, and founder of Zhangbin Costume Design Studio, a commercial entity that, through its artisanship, contributes to preserving and perpetuating centuries-old practices behind traditional Chinese opera costumes. This connection was central to establishing the module content, students' work critique, selection and execution of the prototypes, and setting of further objectives for the current project. XJTLU's Design School local workshop, including a range of digital and analogic tools addressing textile manufacturing on a small scale, was the leading site for the execution of the current prototype. The author and his collaborators exploited the lab to generate digital embroidery, textile pleating, textile lamination, 3D printing, and electronics prototyping related to the project. Finally, the prototype exhibition at the Design Shanghai fair, among a collection of research artifacts from the design school faculties, was the chance to engage with the audience, showcase the outcomes of an ongoing project, and establish the objectives for further development.

Some of the questions that this developing project is seeking to answer are: Can blending technologies with traditional embroidery help to preserve this endangered skill? Can Kunqu opera benefit from an addition of technology to its traditional costumes? Would doing so impair its UNESCO designations?

The Project Development

During the postgraduate module at XJTLU in Suzhou, one of the assignments gave students the task of innovating Kunqu opera by redesigning traditional costumes. Several projects stressed the possibility of connecting tradition with scientific topics, engaging a range of cutting-edge technologies to generate specified visual and narrative outcomes.

Creating a costume capable of transforming on stage was a common objective many tried to achieve. Some projects used shortening or elongating techniques borrowed from the making of curtains. Others explored the double sides of fabric and the possibility of flapping the parts to reveal a different design. Several reconsidered optical illusions and the physics in the small scale of the fabric's warp and weft.

Yidi Zhao, one of the master students, also examined ways to make some costume features dynamic. She tried to understand how the subjects of the delicate embroidery, generally themes from nature or or arrangements of flowers and animals as decoration or in patterns, could morph and change

shapes before the audience's eyes, achieving a mesmerizing effect and emphasizing highlights of the plot.

During this research, she came across a paper describing the mechanics of membrane structures unfolding into deep space to allow satellite dishes to operate more efficiently and practically (Parque et al. 2021, 2595). The paper describes a kind of origami scheme that can roll up on itself into a circular pattern, achieving the exciting effect of a blossoming flower spreading its petals to a maximum extent and then gathering them again, closing on itself. At that point, the design was just a conceptual prototype that the student made from thin paper with a cardboard inner structure. By the end of the module, several prototypes materialized in a few weeks out of a range of textile materials and manufacturing techniques. Initial experiments addressed the pleating technique, a traditional practice in some regions of China that works well to imprint a permanent fold on fabric. Lamination processes to stiffen parts of the fabric were also attempted and gave quite promising results but very little connection to the cultural domain that the student was exploring. Finally, embroidery was considered in an approach to re-work a technique peculiar to the local tradition. The only concession was that in the student version a digital machine executed the embroidery, which makes it easy to produce a large quantity of work in a fraction of the time it would take if the work were done by hand. The results were promising because the embroidery offered a rich esthetic and the functionality of maintaining the folded lines. On the other hand, the use of a digital machine means that mimicry of a long-time exclusively analogic and handmade domain presents an exciting debate starter on the value of artistic reproduction (Benjamin 2007, 4) and its implication on the Chinese manufacturing system (Ledderose 2000, 6). These topics could be the focus during further phases of the project.

After the end of the module, during the following semester, the project was selected among the many exciting choices within that cohort to be further developed and shown in an exhibition of the works in research and design by the school's faculty's . Although there was limited time to create a complete costume with the same kinetic flowers opening and closing automatically, the mechanism that drives the main effect developed entirely, and two flowers were attached to a fabric stretched on a wooden frame. See Figure 2. An Arduino microcontroller operates the mechanism's motor. Also, the Arduino Uno is not suitable for wearing because of its large dimensions and becomes an impediment that could be minimized by implementing a much smaller version, such as the Nano or the Lilypad (Sugathan 2013).

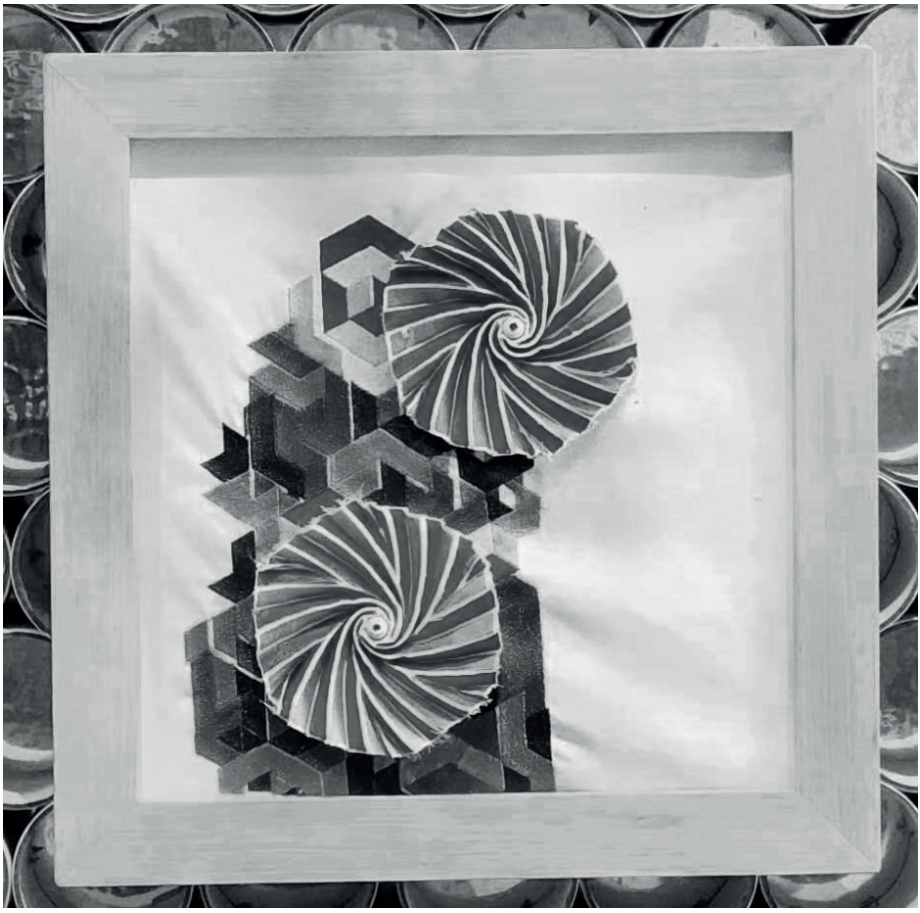

Figure 2. Prototypes of the “automatic” blossoming flower (Parati 2023)

Yidi Zhao realized several prototypes during this phase by combining digital embroidery and pleating. The pleating technique was then deemed unnecessary because the embroidery already provided the folding mechanism within the treated fabric without the tedium of using a pleating mold. The author, also the module leader of the course involved in the research project, was perfecting the mechanism, which would gather an array of nylon threads around the flower shape to pull it open. While Yidi Zhao was testing various textile manufacturing processes, a graduate student, Zhe Zhang, was employed as a research assistant to code the microcon-

troller and the electronics to drive the mechanical device. This aspect was achieved in a short time, and the same student also perfected the folding scheme to facilitate the permanent transfer of the folding lines on the fabric.

Conclusion

While the research, conception, design and manufacture of the current prototype were imperative to achieve a physical product to draw attention and further involvement in the initiative, this is only the initial step in generating further minor improvements in the current system. A healthy debate among the innovators as to maintaining traditional crafts while promoting a flourishing array of intangible cultural heritage is needed, especially in a country like China that has recently shifted away from low-cost manufacturing.

In the future, the author and his network of supporters and collaborators will present outcomes for criticism by experts and scholars of Chinese opera. The involvement of actors and directors in the discussion will lead to developing a further prototype of a complete costume to be used in a formal Kunqu performance. The collaboration with the textile industry, which is interested in innovating the manufacturing environment while addressing cultural and artistic themes, may further strengthen the involvement of some entities based in the region. Some of these entities may promote and support startups and research initiatives that could lead to innovative use of their services and products.

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