

A Study on the Innovation and Development of Ba People Martial Arts Driven by Digital Transformation

Yansong Zhang, Zirui Zeng*

School of Physical Education,
Sichuan University of Arts and
Science, Dazhou, Sichuan,
635000, China

Abstract: The Ba ethnic martial arts are the living fossils of the ancient military skills and folk culture of the Ba ethnic group, embodying a wealth of historical memories and national spirit. However, with the development of modern times, the Ba ethnic martial arts have encountered difficulties such as a reduction in the places for their inheritance, a thinning of the transmission channels, and a broken chain of cultural memory. Digital transformation has brought new hopes to this ancient martial art. Based on the cultural genes and historical evolution of the Ba ethnic martial arts, and combined with the latest trends in current digital technology development, this article analyzes the reasons for promoting the innovative development of the Ba ethnic martial arts through digital transformation and its operational paths. The research shows that digital transformation can assist the development of the Ba ethnic martial arts from four aspects: recording of minor skills, cultural dissemination, educational inheritance, and industrial transformation. It achieves precise preservation of skills through motion capture and 3D modeling, re-creates cultural dissemination methods through digital media, breaks the time and space limitations of verbal and practical teaching with virtual interaction technology, and realizes the transformation and innovation of cultural resources through digital platforms. During the transformation period, risks of technological alienation should be prevented, the relationship between digital reproduction and cultural authenticity should be adjusted properly, a development model of technological assistance, cultural awakening, and ecological reconstruction should be formed, providing theoretical references and operational paths for the current revitalization of traditional ethnic martial arts.

Keywords: Ba People Martial Arts, Digital Transformation, Cultural Heritage Innovation, Intelligent Dissemination

1. INTRODUCTION

The Ba people were a brave and skilled warrior ethnic group in ancient China. The military skills and sacrificial martial dances of the Ba people were closely related. Both were important sources of the Ba people's martial arts culture. "During the reign of King Wu of Zhou's campaign against King Zhou, the Ba and Shu armies were enlisted... The Ba army was fierce and courageous, and their music and dance were used to subdue the people of Yin. The enemy troops turned their backs and fled." The "Huayang Guizhi · Ba Chapter" records the bravery of the Ba army and their powerful music and dance. This was both an expression of military tactics and an early display of martial arts skills. The Ba people's martial arts underwent a long development process. In the process of integrating with other ethnic cultures such as the Tujia and Miao ethnic groups, a cultural gene mainly consisting of the worship of the white tiger totem, the ritual of witchcraft and 傩, and mountain survival skills gradually formed, and it deeply influenced many martial arts schools such as Mount Emei martial arts and Wudang martial arts.

However, the structure of modern society has changed, and the cultural ecological environment for the survival of Ba people's martial arts is becoming smaller and smaller. The inheritors are getting old and there are no successors. The traditional method of oral transmission and hands-on teaching cannot continue. The mode of dissemination is limited to local performances and written texts, which is not easily accepted by the popular cultural dissemination of today's society. Many combat techniques and cultural memories may face the risk of disappearance due to the lack of systematic written records. In

2021, the "14th Five-Year Plan for the Protection of Intangible Cultural Heritage" pointed out that the digital technology should be used to improve the protection and inheritance level and dissemination popularity of intangible cultural heritage. At this time, discussing how to promote the innovative development of Ba people's martial arts through digital transformation is both an answer to the problems of the times and a safeguard of ethnic culture. In the Figure 1, the Ba people martial arts are demonstrated.



Figure. 1 The Demonstration of Ba People Martial Arts (Source: https://image.baidu.com/search/detail?adpicid=0&b_appid=8675947720956452467&bdtype=15&commodity=©right=&cs=3322483814%2C3116363891&di=7656476707871784961&fr=click-pic&fromurl=http%253A%252F%252Fwww.163.com%252Fdy%252Farticle%252FE30JO6V20514F4TS.html&gsm=1e&hd=&height=0&hot=&ic=&ie=utf-8&imgformat=&imgratio=&imgspn=0&is=0%2C0&isImgSet=&lates t=&lid=952a09ff023e7d3c&lm=&objurl=https%253A%252F%252F)

img.ws.126.net%252F%253Furl%253Dhttp%25253A%25252F%25252Fspider.ws.126.net%25252F078ded0f82d1ae92cac57f069df8192.jpg%2526thumbnail%253D660x2147483647%2526quality%253D80%2526type%253Djpg&os=3803368144%2C4152770003&pd=image_content&pi=0&pn=7&rn=1&simid=3322483814%2C3116363891&nbaiduimagedetail&width=0&word=%E5%B7%B4%E4%BA%BA%E6%AD%A6%E6%9C%AF&z=)

2. THE CULTURAL GENES AND TRANSMISSION PREDICAMENT OF BA ETHNIC GROUP'S MARTIAL ARTS

Ba people's martial arts is not a standalone combat system. It is a comprehensive combination of military warfare, totem worship, mountain life, ancestor worship activities, and other elements gradually formed by Ba people in the long river of history. We can capture its cultural genes in three parts.

The military martial arts genes are the foundation of Ba people's martial arts. Ba people are naturally strong and brave. In the "Biography of Southern Barbarians and Southwest Barbarians" in the Book of Later Han, it is said that "Ba Shu fell into battle". The spirit of martial arts directly created Ba people's "ingenious" swordsmanship, "superb" shooting skills, and unique combat skills. Archaeological evidence has confirmed that 'weapons must have been unearthed from the men's tombs' of the Ba people. Many weapons such as Ba style willow leaf swords, Ba style spears, and copper arrowheads have been unearthed, which precisely proves that the Ba people used war to enhance their military prowess'.

The totemic belief genes deeply influence the spiritual temperament of Ba people's martial arts. The worship of the White Tiger makes the "tiger" flow everywhere in the decoration of equipment, the naming of routines, and the imagery of movements in Ba people's martial arts. The Tujia martial arts techniques such as "White Tiger Digging Heart" and "Tiger Jumping into a Stream" are directly related to the worship of tigers. Totem belief elevates martial arts cultivation from a technical level to a spiritual ritual level, giving Ba people martial arts a cohesive effect of a community of faith.

The mountain survival genes determine the technical style of Ba people's martial arts. The mountain features compact movements, agile and fast movements, and close fitting short hits. Many instruments are directly derived from agricultural tools, and the swallowtail axe is a variation of the axe, rake, and hoe; The Palace Heaven Comb is the embodiment of a wizard's magical tool; The octagonal bend is a variation of the rope rack used by the raincoat maker. Martial arts have penetrated into people's lives.

But it is precisely this cultural characteristic of "ecological integration" that makes Ba people's martial arts extremely fragile in modern society. In modern society, there is no longer a need to use martial arts to fight and obtain living materials. The environment of mountain life has been replaced by urban development, and the ritual space of Wu Nuo belief is gradually shrinking. The connection between Ba people's martial arts and life is gradually being severed. The most serious thing is that Ba people's martial arts have always been taught through the method of "oral transmission and hands-on teaching", and many ideas about power application, breathing techniques, and tactics cannot be fully recorded. The aging of the inheritor team is very serious, and young people have been studying martial arts for too long with little practical return, so they are unwilling to join the ranks of inheritors. From the perspective of dissemination, Ba people's martial arts are mostly limited to local exhibitions or

academic records, and have not formed an effective dissemination mechanism for the public. Their cultural influence is also gradually declining.

3. THE LOGICAL MECHANISM BY WHICH DIGITAL TRANSFORMATION DRIVES THE INNOVATIVE DEVELOPMENT OF BA PEOPLE'S MARTIAL ARTS

Digital transformation is not about "putting Ba people's martial arts on the screen", but about reshaping their recording, dissemination, inheritance, and even value transformation through digital technology, transforming from "museum style preservation" to "dynamic development". It contains its own theoretical logic, which can be explained using cultural memory theory. Digital media provides unprecedented technological possibilities for the storage, activation, and recreation of cultural memory.

In terms of skill recording, traditional literature records and image recording cannot accurately record the spatiotemporal parameters and force trajectory of martial arts movements. With the help of motion capture technology, sensors can be attached to the main joints of the inheritors to capture real-time data on their body movements and generate three-dimensional dynamic models. This is the transition from "blurry images" to "accurate data". Moreover, with the help of high-precision 3D scanning, the standard combat posture of the inheritor can be modeled, turning "tacit knowledge" into quantifiable and reusable digital assets. The benefits of doing so are twofold. Firstly, it provides a model for future teaching; The second also leaves materials for future research.

In terms of cultural dissemination, digital media breaks down regional and intergenerational information barriers. The fragmented dissemination of short video platforms, immersive experiences in virtual museums, and discussion based dissemination of social media topics have turned the cultural charm of Ba people's martial arts into a form that is acceptable to current audiences. But digital communication is not simply about conveying information, but about "participatory culture", where the audience shifts from passive to active participants, using comments, reposts, and secondary creations for cultural dissemination and fission. This shift in communication logic makes it possible for Ba people's martial arts to become a 'public cultural resource'.

In terms of educational inheritance, virtual reality (VR), augmented reality (AR), and other technologies may be able to solve the temporal and spatial dilemma of "teaching by example". By using VR headsets, one can enter a simulated boxing gym space and learn boxing routines from a virtual coach. AR instantly connects boxing charts and technique demonstrations, achieving autonomous learning that blends reality and virtuality. Digital avatar teaching cannot completely replace physical communication between teachers and students, but it can expand the scope of teaching, lower the learning threshold, and enable more people to experience the basic skills of Ba people martial arts.

From the perspective of industrial transformation, digital platforms have opened up a new path for the cultural value realization of Ba people's martial arts. Regarding the development of digital cultural and creative products, immersive cultural experience projects, and online teaching courses centered around Ba people's martial arts, these cultural commodities can all turn cultural resources into

tradable products. Moreover, through the networking function of digital platforms, Ba people's martial arts can integrate with industries such as tourism, health care, and education, forming a cross disciplinary ecosystem of the "martial arts+cultural tourism+digital", which provides economic support for the long-term development of Ba people's martial arts.

4. THE PRACTICAL APPROACHES AND REAL CHALLENGES OF DIGITAL TRANSFORMATION

According to the logical analysis above, the digital transformation of Ba people's martial arts can be carried out from the following aspects:

Establishing a multimodal digital resource library and creating a multimodal digital resource library is a fundamental project for transformation. Using high-definition cameras, motion capture, 3D scanning, high fidelity recording and other methods, comprehensively collect information on Ba people's martial arts routines, equipment techniques, inheritors' history, and ritual scenes, and organize these contents into multimodal digital archives in various formats such as text, photos, videos, 3D models, and audio. Drawing on the experience of building the Tan's Miao Quan database, the concepts of "uniqueness, usefulness, standardization, and co creation and sharing" should be integrated into the database planning. Resources should also be integrated according to the framework of "boxing equipment culture characters", and on this basis, Ba cultural symbols such as the White Tiger totem and Ba style decorations should be embedded to enhance cultural recognition.

Building immersive digital display platforms has become a new approach. Thanks to the support of digital resource libraries, people are able to create a virtual museum and VR experience system for Ba people's martial arts, thus breaking the spatial limitations of traditional exhibition displays. Visitors can use VR devices to enter the "Ba Ren Shanzhai" and have a close-up view of the martial arts demonstration movements. Through interactive devices, they can "personally experience" some basic moves. This immersive presentation format optimizes the impact of cultural dissemination and fills the gap in the experience of traditional martial arts that can only be watched but not learned.

Innovating the digital inheritance teaching system is a good move to solve the inheritance crisis. Create an online teaching platform for Ba Ren martial arts, using 3D models formed by motion capture as teaching materials, providing learners with digital teaching content that can be repeatedly viewed and viewed from multiple perspectives. You can also try the combination of online and offline teaching methods of "practicing basic skills online first, and then focusing on details offline", which can not only leverage the advantages of digital technology to expand the scope of learning, but also maintain the physical and emotional communication of face-to-face teaching.

Promoting the digital operation of cultural IP is the main way of industrial transformation. Digital creative development can be carried out on the elements of Ba people's martial arts culture, such as the White Tiger Totem, Ba Yu Dance, and relatively rare martial arts equipment, to create products such as short video content, digital collectibles, and cultural and creative products. Referring to the business model of "brand plus event plus cultural tourism" in Emei martial arts, Ba people martial arts can also shape a unique cultural IP,

optimize brand influence through various digital platforms, and drive the development process of related industries.

However, digital transformation is not easy to achieve. There is a contradiction between technological adaptation and cultural fidelity. The numerical record is accurate, but the aesthetic taste of martial arts such as "charm" and "momentum" is difficult to quantify; Immersive experience may shock, but it will turn culture into a visual spectacle. We must adhere to the principle of "technology serving culture" and approach cultural interpretation with clarity at every stage of collection, processing, and display, without allowing technology to override culture itself.

The dual scarcity of funds and talents, as well as the high cost of technology such as motion capture and VR development, makes it difficult for Ba people martial arts to afford the expenses required for transformation. The economic conditions of the inheritors are average, and the cost of transformation is relatively high. It is necessary to seek support from government special funds and explore ways to collaborate with enterprises and universities. From a talent perspective, it is rare to find composite talents with intangible cultural heritage awareness and mastery of digital technology. Therefore, it is necessary to promote the establishment of relevant interdisciplinary disciplines in universities to purposefully cultivate talents who understand martial arts culture and are proficient in using digital technology.

Is the balance of discourse power among participating subjects fair or not? This is a problem that is easily overlooked. If digital transformation is carried out by external technology teams, the dominant position of inheritors will be impacted, and their cultural connotations will be misunderstood or simplified. Therefore, it is necessary to establish a working mode of "inheritors taking charge and technical teams assisting", so that inheritors have decision-making power in cultural interpretation, content review, and other aspects, to avoid the situation where digital achievements become "otherized" specimens.

5. CONCLUSION

The Ba people's martial arts are a dynamic cultural heritage with ethnic memories and physical wisdom. Its current fate involves issues of preserving cultural diversity and transmitting national spirit. Digital transformation has created significant historical opportunities for the Ba people's martial arts. By using accurate recording, innovating transmission methods, intelligent teaching, and industrialization transformation, it re-awakens the vitality in the digital time-space. However, technology is merely a means; the fundamental purpose of the transformation is to activate the inherent vitality of the culture itself. Only by following the principle of "based on culture and applying technology" and correctly handling the tension relationship between digital reproduction and cultural authenticity, can the Ba people's martial arts achieve the paradigm shift from "heritage preservation" to "active development". For the subsequent research on the digital transformation of the Ba people's martial arts, it can involve tracking and observing related implementation cases and making judgments on their effects, or exploring the boundaries between different technological means, in order to provide more practical knowledge reserves and achievements for other traditional forms of sports in ethnic cultures.

6. REFERENCES

- [1] Stamenković, Aleksandar, Mila Manić, Roberto Roklicer, Tatjana Trivić, Pavle Malović, and Patrik Drid. "Effects of participating in martial arts in children: a systematic review." *Children* 9, no. 8 (2022): 1203.
- [2] Ciaccioni, Simone, Oscar Castro, Fatimah Bahrami, Phillip D. Tomporowski, Laura Capranica, Stuart JH Biddle, Ineke Vergeer, and Caterina Pesce. "Martial arts, combat sports, and mental health in adults: A systematic review." *Psychology of sport and exercise* 70 (2024): 102556.
- [3] Moenig, Udo, Minho Kim, and Hyun Min Choi. "Traditional martial arts versus martial sports: the philosophical and historical academic discourse." *Revista de Artes Marciales Asiáticas* 18, no. 1 (2023): 41-58.
- [4] Tropin, Yrui, Leonid Podrigalo, Natalya Boychenko, Olha Podrihalo, Oleksandr Volodchenko, Denis Volskyi, and Mariia Roztorhui. "Analyzing predictive approaches in martial arts research." *Pedagogy of Physical Culture and Sports* 27, no. 4 (2023): 321-330.
- [5] Nazeer, Muhammad Safdar, Raiha Imran, Munazza Amin, and Ewa Rak. "An intelligent algorithm for evaluating martial arts teaching skills based on complex picture fuzzy Dombi aggregation operator." *Journal of Innovative Research in Mathematical and Computational Sciences* 3, no. 2 (2024): 44-70.
- [6] Pang, Yiqun, Yibing Wang, Qiurui Wang, Fengmei Li, Changnian Zhang, and Chuanwei Ding. "Applications of AI in martial arts: A survey." *Proceedings of the Institution of Mechanical Engineers--Part P--Journal of Sports Engineering & Technology* 239, no. 2 (2025).
- [7] Sun, Yao, Roza Tabeshian, Hajer Mustafa, and E. Paul Zehr. "Using martial arts training as exercise therapy can benefit all ages." *Exercise and Sport Sciences Reviews* 52, no. 1 (2024): 23-30.
- [8] Rodrigues, Alba Iara Cae, Risto Marttinen, and Dominique Banville. "Martial arts and combat sports for youth: a 10-year scoping review." *Journal of teaching in physical education* 43, no. 4 (2024): 664-674.
- [9] Jalolov, N. N., B. B. Rakhimov, A. O. Imamova, E. Yo Sultonov, and A. G. Oblokulov. "Proper nutrition of athletes, martial arts." (2023).
- [10] Healey, Gene, David Neumann, Samuel Cornell, and Timothy Piatkowski. "'Martial arts crossed over into the rest of my life': a qualitative exploration of Australian practitioners' experiences of martial arts and combat sports on wellbeing." *Journal of Community & Applied Social Psychology* 35, no. 1 (2025): e70035.
- [11] Moore, Brian, Dean Dudley, and Stuart Woodcock. "The effects of a martial arts-based intervention on secondary school students' self-efficacy: a randomised controlled trial." *Philosophies* 8, no. 3 (2023): 43.