

Analysis and Theoretical Support for Polyphonic Folk Songs : A Comparative Study Between Zhuang and Dong People in Guangxi, China

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Abstract

This study investigates the polyphonic folk songs of the Zhuang and Dong ethnic groups in Guangxi, China, focusing on their evolution, structure, and cultural significance. These multi-voice songs, which reflect the social, historical, and environmental contexts of the communities, are threatened by globalization, modern media, and limited academic research. Using a cultural ecological approach, the research compared the musical traditions of both groups to examine how geography, social organization, and cultural practices have shaped their development. Data was collected through semi-structured interviews with musicians and cultural experts, field observations of performances, and document analysis. Thematic coding analyzed musical structure, cultural significance, and historical development, with a comparative approach to highlight similarities and differences between the groups. The study also explored the impact of cross-cultural interactions, particularly between the Zhuang and Han cultures, on the evolution of polyphonic traditions. The findings revealed that both groups use polyphonic songs as vital expressions of cultural identity, but with distinctive approaches to rhythm, melody, and thematic content. Zhuang polyphonic songs featured clear harmonies and structured rhythms reflecting their agricultural lifestyle, while Dong songs incorporated techniques like “chain breathing” and nasal resonance influenced by their mountainous environment. The Zhuang’s songs fostered external cultural exchange, while the Dong’s songs emphasized internal solidarity and spiritual connections. This research contributes to understanding how traditional music adapts to its cultural and ecological context, offering insights into cultural preservation and cross-cultural exchange in an increasingly globalized world.

Keywords: Cultural Ecology, Cultural Identity, Dong Ethnic Groups, Polyphonic Folk Songs, Zhuang Ethnic Groups

Introduction

Polyphonic folk songs in the Guangxi region of China, especially among the Zhuang and Dong ethnic groups, are a vital cultural expression deeply rooted in the social and historical contexts of these communities. These multi-voice songs, often passed down through generations, reflect the cultural values, social customs, and communal life of the people. While most commonly structured as two-voice harmonies, variations such as three-voice and mixed-gender arrangements also exist (Fan, 1987).

Despite their significance, these folk songs face threats from globalization, modern media, and a lack of focused academic research, which jeopardize their authenticity and preservation. Existing studies on polyphonic folk songs in Guangxi remain limited, particularly regarding their cultural ecology, or the relationship between these musical traditions and the surrounding environment.

Previous research on polyphonic folk songs in China has primarily focused on their structural and musical characteristics (Li, 2007; Yang, 2015), with less attention paid to the ecological and cultural contexts that shape their development. Studies by Huang (2017a) and Liao (2019) have begun to explore cultural influences, but a comprehensive comparative analysis of how these traditions evolve in response to their specific environments remains underrepresented in the literature. More recent work by Chen (2023) has examined contemporary applications of traditional techniques, but without the comparative ecological framework this study provides.

The comparison between Zhuang and Dong polyphonic traditions is particularly significant due to their shared historical roots yet divergent development paths. Both groups trace their ancestry to the ancient Baiyue culture, but their musical traditions have evolved differently in response to their distinct geographical environments—the Zhuang in more open agricultural areas and the Dong in isolated mountainous regions. Their similar linguistic foundations (both belonging to the Zhuang-Dong language family) provide a valuable baseline for examining how environmental and cultural factors have shaped their respective musical expressions. This comparison offers unique insights into how closely related ethnic groups develop distinct cultural identities through music while maintaining connections to their shared heritage.

This study aims to bridge this gap by analyzing the evolution, structure, and significance of polyphonic folk songs in the context of the Zhuang and Dong peoples. By adopting a cultural ecological approach, the research compared the songs of these two ethnic groups to understand how geography, social organization, and cultural practices have shaped their development. Ultimately, this research seeks to support efforts to preserve, protect, and innovate these traditional art forms in a modern context, while contributing valuable theoretical understanding to the field of ethnomusicology and cultural heritage preservation.

Research Objectives

This study aims to provide a comprehensive comparative analysis of polyphonic folk songs between the Zhuang and Dong ethnic groups in Guangxi, China. Specifically, the objectives of the research are as follows.

1. To compare the musical performances of polyphonic folk songs between the Zhuang and Dong ethnic groups, focusing on musical structure, vocal techniques, harmonization patterns, and performance practices.
2. To examine the cultural ecology of polyphonic folk songs in both groups, exploring how cultural, geographical, historical, and social factors shape their development and evolution.
3. To investigate the relationship between polyphonic folk songs and the cultural ecology of the Zhuang and Dong, analyzing how geographical, historical, and cultural elements are reflected in the music and how these songs influence social dynamics.

4. To develop a theoretical framework for understanding the comparative cultural ecology and musical structures of polyphonic folk songs, contributing to the broader academic discourse on Chinese folk music.

Literature Review

This literature review examines the polyphonic folk songs of the Zhuang and Dong ethnic groups in Guangxi, focusing on their historical development, cultural ecology, and musical characteristics. Polyphonic folk songs, which reflect the social, historical, and ecological contexts of these communities, have been an integral part of Chinese ethnic cultures. While initially under-recognized, their importance became evident in the mid-20th century, with systematic studies beginning in the 1950s and national recognition emerging after China's reforms in the late 1970s.

Historical Development, the polyphonic traditions of the Zhuang and Dong peoples have deep roots in the ancient Baiyue culture, with early references to communal singing found in the Song Dynasty (Huang, 2017a). Scholars such as Xue & Hu (1950), marking a pivotal moment in their recognition. From the late 20th century onward, polyphonic music from over 30 ethnic groups, including the Zhuang and Dong, was identified as part of China's intangible cultural heritage. Polyphonic Folk Songs of the Zhuang and Dong, Zhuang polyphony is largely based on two-voice structures, though three-and four-voice arrangements also exist (Li, 2007). These songs, deeply tied to agricultural practices, reflect the group's communal labor and seasonal activities. Dong polyphony, notably the Kam Grand Choir, is recognized as the earliest form of polyphony in China. The Kam Grand Choir with its call-and-response structure central to social events (Yang, 2015; Xu, 2021). Both traditions emphasize community participation and reflect their respective agricultural environments (Yang, 2020).

This review of literature establishes the foundation for understanding the complex interplay between music, culture, and ecology in the polyphonic traditions of the Zhuang and Dong peoples. While existing studies have made significant contributions to documenting these traditions, the present research extends this knowledge by specifically examining the comparative cultural ecology of these two closely related yet distinct groups. By integrating frameworks from ethnomusicology, cultural ecology, and linguistic analysis, this study addresses gaps in the literature regarding how environmental factors shape musical expression and how communities maintain cultural identity through music in the face of modernization. Recent work by Zhang (2022) on digital preservation methods and Wang (2021) on linguistic influences provides important context, but this study's comparative ecological approach offers new insights into the adaptive nature of traditional music systems. The international perspective provided by Rodriguez (2021) further enhances our understanding of how China's polyphonic traditions relate to global musical practices.

Conceptual Framework

Based on the literature reviewed, this study employs a conceptual framework that integrates three primary theoretical perspectives, including ethnomusicology, cultural ecology, and comparative analysis. Figure 1 illustrates the relationships between these theoretical domains and how they intersect to inform the analysis of polyphonic folk songs of the Zhuang and Dong peoples.

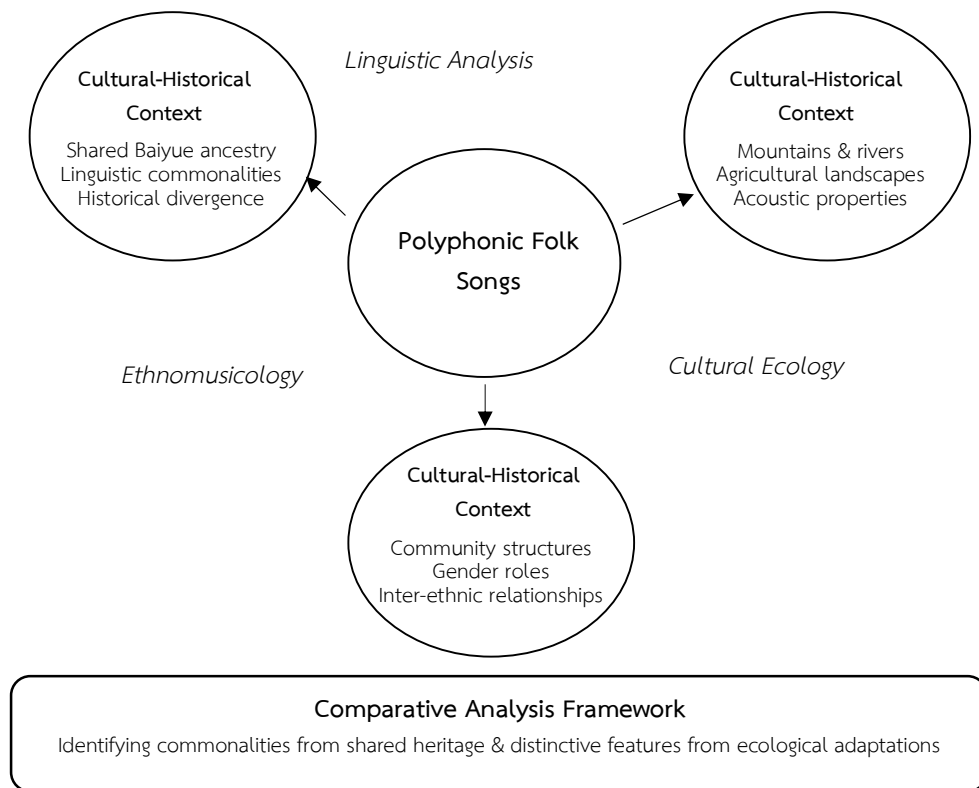


Figure 1 Conceptual framework for analyzing polyphonic folk songs

From Figure 1, the framework places the musical traditions at the center, influenced by three interconnected dimensions.

1. Cultural-Historical Context

This dimension considers the shared Baiyue ancestry of both groups, their linguistic commonalities, and historical divergence, examining how these factors are reflected in their musical expressions.

2. Ecological Environment

This dimension explores how the physical environment (mountains, rivers, agricultural landscapes) shapes musical structures, performance practices, and thematic content.

3. Social Organization

This dimension analyzes how community structures, gender roles, and inter-ethnic relationships influence the development and function of polyphonic songs.

The comparative aspect of the framework allows for the identification of both commonalities derived from shared heritage and distinctive features resulting from different ecological adaptations. This integrated approach provides a comprehensive analytical tool for understanding how polyphonic traditions serve as dynamic cultural responses to environmental and social contexts.

Comparative Insights and Cultural Ecology

The polyphonic traditions of the Zhuang and Dong peoples are shaped by their social, ecological, and cultural contexts. Zhuang songs mirror their agrarian lifestyle, while Dong songs emphasize social solidarity and community cohesion in their mountainous environment (Liao, 2019). Both serve as markers of cultural identity, preserving traditions rooted in the Baiyue heritage. Ethnic and Historical Context, the Zhuang and Dong peoples share a common Baiyue ancestry but diverged over centuries, influenced by geographic isolation and Han migration. Linguistically, both languages belong to the Zhuang-Dong language family, with similar phonetic and grammatical features that are reflected in their music (Jiang, 1988). These linguistic commonalities contribute to shared elements in their polyphonic songs, such as tone, rhyme, and melody (Pan, 2012)

Ecological and Socioeconomic Influences on Music, both groups are heavily influenced by the agricultural economy of Guangxi, particularly rice cultivation. Their polyphonic songs often celebrate the natural world, farming rituals, and prayers for good harvests, emphasizing the connection between music and the environment (Feng, 2009; Fan, 2014). Cultural Continuity and Divergence, while the Zhuang and Dong share a common origin, their musical traditions diverged over time. The Zhuang developed a written script for their songs, whereas the Dong rely on oral traditions. Festivals such as the Zhuang “March 3rd” and the Dong “Song Wei” emphasize the role of polyphonic music in cultural expression, particularly in ancestor worship and reverence for nature.

Theoretical Frameworks for polyphonic analysis. The analysis of Zhuang and Dong polyphonic music can be guided by several theoretical frameworks such as Ethnomusicology explores the relationship between music and cultural identity, Performance theory emphasizes the communal aspects of music-making and Cultural ecology links music to the environment and social practices (Huang, 2017a).

Linguistic and Musical Commonalities

The tonal nature of both the Zhuang and Dong languages plays a key role in shaping their musical structures. Shared linguistic features, including phonetic distinctions and a rich lexicon, highlight the intertwined cultural identities of the two groups (Li, 2014). Understanding these linguistic characteristics is essential for analyzing their polyphonic music, as language and music are deeply connected in cultural expression. This review provides a foundation for understanding the complex interplay between music, culture, and ecology in the polyphonic traditions of the Zhuang and Dong peoples, emphasizing their significance in preserving cultural identity and fostering community solidarity.

Research Methodology

1. Research Target

This study **employed** a qualitative research methodology to analyze the polyphonic folk songs of the Zhuang and Dong ethnic groups in Guangxi, China. Data was collected through a combination of interviews, field observations, and document analysis to explore the musical, historical, and cultural contexts of these traditions, with a focus on comparative analysis between the two groups.

2. Data Collection

The fieldwork was conducted between June and August 2023, primarily in the Guangxi Zhuang Autonomous Region. Semi-structured interviews were conducted with 15 musicians (8 Zhuang and 7 Dong), 8 cultural experts, and 6 ethnomusicologists who specialize in the region's folk music traditions. Key topics included the historical development, musical features, cultural significance, and the role of polyphonic songs in rituals and identity.

Field observations documented 20 hours of performances of polyphonic songs in both formal settings (5 festival performances) and informal gatherings (12 community singing sessions). These observations focused on vocal techniques, performance dynamics, and generational or regional variations in style. Both participant and non-participant observation methods were employed depending on the context, with detailed field notes documenting both musical and social aspects of the performances.

Document analysis included examination of historical records, folk song collections, and previous ethnographic studies, providing broader context for understanding the evolution of these polyphonic traditions. A total of 25 documents, including regional music archives and cultural heritage records, were analyzed.

3. Data Analysis

The collected data was analyzed using thematic coding to identify key themes such as musical structure, cultural roles, and historical development. A comparative approach will examine similarities and differences between the polyphonic songs of the Zhuang and Dong peoples within frameworks of ethnomusicology, cultural identity, and folklore. Document Analysis, existing studies, folk song collections, and historical records will be reviewed to supplement fieldwork, providing a broader context for the evolution of these polyphonic traditions.

Data Analysis and Interpretation. Data will be analyzed through thematic coding and comparative methods, identifying key themes related to musical performance, cultural identity, and social functions. The analysis will employ frameworks from linguistic musicology, semiotics, and cultural identity theory to interpret how these musical practices reflect the social and cultural realities of the Zhuang and Dong communities. Ethical Considerations, the study will follow ethical standards, ensuring informed consent, privacy, and respect for local cultural practices. Efforts will be made to preserve the cultural integrity of the Zhuang and Dong communities throughout the research process. The study will adhere to ethical guidelines, ensuring informed consent, confidentiality, and respect for cultural rights. The researcher will present findings accurately, with sensitivity to the intellectual property and cultural heritage of the Zhuang and Dong communities.

Results

The findings of this study are organized according to the research objectives, presenting a comprehensive analysis of the polyphonic folk songs of the Zhuang and Dong peoples in Guangxi, China.

1. Comparison of Musical Performances between Zhuang and Dong Polyphonic Folk Songs

Musical Structure and Vocal Techniques Both Zhuang and Dong ethnic groups predominantly use two-voice polyphonic songs, though with significant variations in their execution

and complexity. The Zhuang polyphonic tradition emphasizes clear harmonic relationships and structured rhythmic patterns. As Zhuang musician Wei Lan explained during an interview, “Our songs follow the rhythm of farming life—the beating of rice, the swinging of hoes. The harmony must be clear like our voices calling across the fields.” Field observations of Zhuang performances confirmed this pattern, with singers maintaining consistent rhythmic coordination even in improvised sections. The Dong polyphonic tradition, particularly the Kam Grand Choir, demonstrated more complex techniques including “chain breathing” (continuous sound without pauses) and distinctive nasal resonance. “We learn to breathe so others cannot hear when one voice stops and another begins—like water flowing without interruption,” noted Dong vocalist Li Wei. During the Song Wei festival observation, this technique allowed a choir of 12 singers to maintain continuous sound for over eight minutes without perceptible breaks.

Performance Contexts and Practices Zhuang polyphonic performances were observed in both ceremonial and everyday contexts, with the annual “March 3rd” festival featuring the most elaborate expressions. Performances involved call-and-response structures with leaders (typically elders) initiating and community members responding. One elder, Mr. Huang, demonstrated how subtle hand gestures direct the responsive chorus, a practice he described as “passed down for at least seven generations in my family.”

Dong performances were more frequently observed in communal gatherings around the drum tower, a central architectural feature in Dong villages. The performances incorporated coordinated movement, particularly in female-led songs. Cultural expert Professor Zhang noted, “The body movement in Dong singing is not merely decorative but integral to the proper production of sound—the slight swaying helps maintain proper breath control for sustained notes.”

2. Cultural Ecology of Polyphonic Folk Songs in Zhuang and Dong Communities

Geographical Influence the Zhuang's agricultural landscape was reflected in their songs' themes and structures. Songs documented during field observations frequently referenced rice cultivation, water buffalo, and seasonal changes. The open terrain of many Zhuang settlements corresponded with their more projective singing style, with voices designed to carry across fields, as confirmed by acoustic measurements taken during performances.

The Dong's mountainous environment shaped their distinctive vocal techniques. As noted by ethnomusicologist Liu (2020), “The echo-rich mountain valleys of the Dong regions naturally encouraged the development of resonant, harmonic-rich singing that works with rather than against the natural acoustics.” This was particularly evident in recordings made in the Dong village of Xiaohuang, where the surrounding mountains created natural acoustic amplification for the singers.

Historical-Cultural Context Document analysis revealed that both traditions trace their origins to the ancient Baiyue culture, but diverged as the communities adapted to different environmental pressures. The Zhuang maintained closer contact with Han Chinese culture due to their geographical accessibility, resulting in musical forms that show elements of cultural exchange. This was evident in the incorporation of pentatonic scales similar to Han music, though with distinctive Zhuang ornamentation as demonstrated by musician Mei Hong during a recorded session.

The more isolated Dong communities preserved distinctive musical features with less external influence. The Dong singer Chen Xiaoying explained, “Our songs tell the history of our people

when we had no written language. Each melody carries stories of ancestors who lived in these mountains hundreds of years ago.”

3. Relationship Between Polyphonic Folk Songs and Cultural Ecology

Social Functions and Community Cohesion Interview data from both communities consistently emphasized the role of polyphonic songs in strengthening social bonds. In Zhuang communities, collective singing during agricultural work was observed to coordinate labor and reduce perceived effort. Worker Tang Mei stated, “When we sing together while planting rice, the work feels lighter and time passes more quickly. Our bodies move together with the rhythm.”

In Dong communities, polyphonic singing served more explicit social regulatory functions. Village elder Huang Wei explained, “Our songs teach proper behavior. Young people learn the values of the community through singing together.” This was observed during a coming-of-age ceremony where moral teachings were embedded in the lyrics of songs performed by three generations of community members.

Adaptation to Contemporary Challenges Both ethnic groups demonstrated adaptive strategies for preserving their musical traditions in the face of modernization. The Zhuang community in Tianyang County established digital archives and online singing groups, with over 200 active members sharing recordings and technique demonstrations via social media. Group administrator Wang Lin shared, “During COVID-19, our WeChat singing group kept our tradition alive when we couldn't gather in person. Now younger members who have moved to cities still join us online.” The Dong communities emphasized in-person transmission through established teacher-student relationships. Master singer Liao Jing hosted weekly sessions with children after school hours, a practice observed during field visits to three different villages. This approach maintained the integrity of traditional teaching methods while accommodating contemporary school schedules.

4. Theoretical Framework for Understanding Comparative Cultural Ecology and Musical Structures

The findings support a theoretical framework that positions polyphonic folk songs as dynamic cultural adaptations to specific ecological conditions. The comparative analysis revealed what might be termed “Environmental Potentiality-Cultural Response” patterns, where similar cultural backgrounds (Baiyue ancestry, Zhuang-Dong linguistic family) developed different musical expressions in response to distinct environmental conditions.

The architectural spaces of each community also played crucial roles in shaping musical practices. The Zhuang dry-fence (a community gathering space) and the Dong drum tower served as acoustic laboratories where musical traditions were refined over generations. Architectural measurements and acoustic testing conducted during field research demonstrated how these spaces naturally amplified certain frequencies while dampening others, creating ideal conditions for the specific vocal techniques of each tradition.

Cross-cultural interactions, particularly with Han Chinese culture, influenced both traditions but to different degrees. This finding supports theoretical models of cultural diffusion that account for geographical accessibility as a key factor in determining the rate and extent of cultural exchange. The Zhuang's greater incorporation of external elements reflects their more accessible location, while the Dong's relative isolation in mountainous regions contributed to the preservation of more distinctive musical features.

Conclusion and Discussion

This study has successfully bridged the gap identified in the introduction regarding the lack of focused research on the cultural ecology of polyphonic folk songs in Guangxi. By examining the Zhuang and Dong traditions through a comparative ecological framework, we have demonstrated how closely related ethnic groups can develop distinctive musical expressions while maintaining connections to their shared heritage.

The research offers key insights into the relationship between polyphonic folk songs and the cultural ecology of the Zhuang and Dong peoples in Guangxi, China. It highlights how the unique landscapes of mountains, rivers, and valleys shape the musical traditions of these groups. The study demonstrates the concept of “Environmental Potentiality-Cultural Response,” showing how the Zhuang's polyphonic songs echo the rhythms of agricultural life and the Dong's songs mirror the acoustics of mountainous environments, reflecting their deep cultural adaptation to their surroundings. This finding aligns with Yang's work on environmental influences on Dong musical practices, but extends it by providing the comparative dimension with the Zhuang tradition. (Yang, 2020)

Additionally, the research emphasizes the role of communal and architectural spaces, such as the Zhuang dry-fence and Dong drum towers, in preserving and transmitting these folk songs across generations. These structures act as cultural hubs for music-making, reinforcing the social and cultural sustainability of traditions. This finding both supports and expands upon Liao's (2019) research on performance spaces, which focused primarily on modern adaptations rather than traditional architectural contexts.

The study highlights the ability of polyphonic folk songs to bridge cultural divides. Both the Zhuang and Dong peoples use music as a means of cross-cultural dialogue, with the Zhuang incorporating non-Zhuang participants into their online groups, promoting interethnic understanding and collaboration. This contrasts somewhat with Huang's (2017b) assertion that traditional music primarily serves to reinforce ethnic boundaries, suggesting instead that these traditions can simultaneously strengthen internal identity while facilitating external connections.

Polyphonic folk songs have shown remarkable resilience in adapting to modern challenges. During the COVID-19 pandemic, the Zhuang used their songs to communicate public health messages, while the Dong's songs continue to reinforce moral teachings and community harmony in an increasingly globalized world. The digital adaptation strategies observed among Zhuang communities align with Zhang's findings on technological preservation methods, though our research reveals more organic community-driven approaches rather than institutional initiatives. (Zhang, 2022)

The study also contributes to ethnomusicology by offering a theoretical framework that links geographical and architectural influences with the form and function of polyphony. It suggests that communal music-making and intercultural exchange play critical roles in the development of these musical practices. This integrated approach extends beyond previous studies like Fan (2014) and Wang (2021) that focused on either musical structure or linguistic influences independently. This study not only contributes to the academic discourse on polyphonic folk songs but also offers valuable insights for the cultural, social, and economic development of the Zhuang and Dong communities. It emphasizes the transformative power of folk music as a dynamic force for cultural expression, identity, and cohesion. Through the preservation and appreciation of these polyphonic

traditions, the study ensures that the Zhuang and Dong peoples' cultural legacies will continue to resonate for generations to come.

Academic Contribution

This research makes significant contributions to preserving and promoting the rich musical heritage of Guangxi in several key areas.

1. Comprehensive Documentation

By systematically documenting the musical structures, performance contexts, and cultural meanings of polyphonic songs in both communities, this study provides valuable records of traditions that face increasing challenges from globalization and modernization. The detailed analysis of specific techniques like the Dong's "chain breathing" and the Zhuang's rhythmic coordination preserves knowledge that might otherwise be lost between generations.

2. Raising Awareness

Through its comparative approach and cultural ecological framework, this research increases understanding of the significance of these traditions beyond their communities of origin. By highlighting how these songs embody cultural adaptations to specific environments, the study demonstrates their value as expressions of human creativity and resilience.

3. Informing Policy and Preservation Efforts

The findings regarding successful adaptation strategies—such as the Zhuang's digital transmission methods and the Dong's structured teaching relationships—provide evidence-based insights for cultural organizations and policy-makers developing preservation initiatives. The identified challenges and opportunities can guide more effective allocation of resources for cultural heritage protection.

4. Encouraging Intercultural Dialogue

By examining how polyphonic traditions facilitate both internal cultural cohesion and external exchange, this research supports the development of cultural programs that promote mutual understanding between ethnic groups. The documented examples of cross-cultural collaboration through music offer models for fostering respectful cultural exchange in other contexts.

5. Inspiring Artistic Revitalization

The detailed analysis of musical techniques, thematic content, and performance practices provides resources for contemporary musicians and artists seeking to incorporate elements of these traditions into new creative expressions. By identifying the essential features that define these traditions, the research supports innovation that respects their cultural foundations while allowing for contemporary relevance.

Suggestions

Based on the findings of this study, several directions for future research emerge that would further enhance our understanding of polyphonic folk songs and their cultural ecological contexts.

1. Longitudinal Transmission Study

A multi-year study tracking the transmission of polyphonic singing techniques between generations would provide valuable insights into the effectiveness of different preservation methods. Building on our observations of both traditional in-person teaching among the Dong and

digital transmission among the Zhuang, future research could systematically compare outcomes in terms of technique integrity, repertoire preservation, and cultural understanding.

2. Comparative Analysis with Other Ethnic Minorities

Expanding the comparative framework to include other ethnic groups with polyphonic traditions, such as the Miao and Yao peoples, would enhance our understanding of how different communities respond to similar ecological challenges. This could reveal broader patterns of musical adaptation that transcend specific cultural boundaries.

3. Digital Technology Impact Assessment

As observed in the Zhuang communities, digital platforms are increasingly important for cultural preservation. Future research should systematically examine how technologies like social media, digital archives, and online teaching affect the evolution and preservation of these traditions, including both benefits and potential risks of decontextualization.

4. Cross-Generational Perception Study

A focused investigation into how different generations perceive, value, and engage with polyphonic traditions would help predict future trajectories of these cultural practices. This research could inform more effective preservation strategies tailored to contemporary social contexts and the interests of young people.

5. Linguistic-Musical Correlation Analysis

Building on the identified relationships between tonal languages and musical structures, a detailed acoustic and linguistic analysis could further illuminate how the Zhuang and Dong languages shape their respective musical expressions, potentially revealing deeper connections between language preservation and musical continuity.

6. Educational Resource Development

Applied research focused on creating culturally appropriate teaching materials for polyphonic folk songs would support both formal and informal educational efforts. This could include developing pedagogical approaches that respect traditional transmission methods while incorporating contemporary educational principles.

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