
| RESEARCH ARTICLE

Multimodal Metaphor Strategies for the International Communication of Grand Canal Cultural Symbols: Practical Construction Based on Cultural Space Theory

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| ABSTRACT

Taking cultural space theory as the core analytical framework, this study systematically explores the multimodal metaphor strategies for the international communication of Grand Canal cultural symbols. Through in-depth analysis of communication practices in regions along the Grand Canal (including Beijing, Hangzhou, Yangzhou, and Suzhou), three targeted core communication strategies are proposed. At the physical level, construct "metaphorical spatial corridors" to realize cross-temporal and cross-spatial reproduction of cultural scenes. At the behavioral experience level, create "embodied metaphor theaters" to strengthen audience participatory interaction. At the symbolic meaning level, cultivate "co-creative metaphor communities" to promote cross-cultural value resonance. Through the core anchoring role of linguistic metaphors and the synergistic interaction of multimodal symbols, the strategies drive the transformation of Grand Canal cultural symbols from "one-way symbol output" to "cross-cultural meaning symbiosis", achieving the recontextualization of cultural connotations and the regeneration of symbolic value. This study not only enriches the theoretical system of cross-cultural communication and metaphor studies but also provides a systematic solution with both theoretical depth and practical value for the international communication of Chinese cultural symbols such as the Forbidden City, Kunqu Opera, and traditional Chinese medicine.

| KEYWORDS

Grand Canal; cultural symbols; linguistic multimodal metaphor; cultural space theory

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1. Introduction

1.1 *The Context of the Times: Dual Demands of Cultural Strategy and Cross-Cultural Communication*

As a flowing World Cultural Heritage and a national cultural symbol with a history of over 2,500 years, the Grand Canal stretches over 1,794 kilometers, connecting the five major water systems of the Haihe, Yellow River, Huaihe, Yangtze River, and Qiantang River. Its cultural symbols condense multiple core connotations, including the wisdom of ancient water conservancy engineering (represented by sluices, docks, and canal embankments), the integration of north-south cultures (reflected in diet, opera, and folk customs along the route), and the living inheritance of history (embodied in intangible cultural heritage such as canal transportation skills and dragon boat racing). These symbols have become a highly representative communication carrier in China's "Going Global" cultural strategy, bearing the important mission of showcasing the diversity and continuity of Chinese civilization.

The national "14th Five-Year Plan for Cultural Development" clearly proposes to "promote the digital communication and international exchange of fine traditional Chinese culture", and the Outline Plan for the Protection, Inheritance, and Utilization of the Grand Canal Culture further emphasizes the need to "strengthen the international dissemination of Grand Canal culture and enhance its global influence". These policies provide clear strategic guidance and institutional support for the international communication of Grand Canal cultural symbols. However, in the context of cross-cultural communication, Grand Canal cultural symbols face severe practical dilemmas that restrict their international influence.

Firstly, the accelerated dissolution of original communication spaces has led to the loss of contextual support for cultural symbols. With the rapid advancement of urbanization and industrialization, traditional canal transportation scenes, coastal village communities, and traditional festival rituals (such as canal temple fairs and dragon boat races) have gradually disappeared. This makes it difficult to effectively convey core cultural connotations such as "harmony between humans and nature" (the symbiosis of the canal and the surrounding ecological environment) and "north-south integration" (the mutual exchange of materials and cultures along the canal) through single symbolic forms. Secondly, the inherent differences between Chinese and Western cultural cognitive systems have caused serious semiotic translation barriers. Concepts with exclusive Chinese cultural attributes, lack corresponding cognitive references in Western culture, making them prone to cognitive deviations or even misunderstandings among international audiences. For example, the direct translation of "dragon vein" as "dragon vein" may trigger associations with Western myths and legends, deviating from its original meaning of "the core of civilization inheritance". Thirdly, the homogenization of international communication content and the lack of interactive experience have led to weak audience engagement. Most existing communication practices rely on static forms such as exhibitions and documentaries, failing to fully mobilize international audiences' sensory experiences and participatory enthusiasm, resulting in superficial understanding and low emotional resonance.

Therefore, exploring innovative strategies suitable for cross-cultural communication scenarios, addressing the problems of cognitive gaps, contextual rupture, and inefficient interaction, has become an urgent task to activate the international influence of Grand Canal cultural symbols and promote the effective "Going Global" of Chinese culture.

1.2 Technological Background: Digital Technology Reshaping the Paradigm of Cross-Cultural Communication

We are currently in the midst of a digital technological revolution driven by AI, VR, GIS, big data, and blockchain. This revolution has triggered a profound paradigm shift in the field of cultural communication, promoting the transformation of communication models from "static preservation and one-way dissemination" to "dynamic participation and symbiotic co-creation". Digital technology, with its unique advantages of breaking through physical time and space constraints, enhancing sensory immersion, and enabling precise matching, has provided multiple implementation paths for the international communication of Grand Canal cultural symbols.

GIS technology can accurately reconstruct the spatial context of the Grand Canal. By integrating high-precision geographic data, historical maps, and cultural heritage distribution information, a digital twin model of the Grand Canal can be built to reproduce the spatial layout of the canal, the distribution of ancient wharves, and the connection of water systems. This allows international audiences to intuitively perceive the grand scale and spatial logic of the Grand Canal. VR and augmented reality (AR) technologies can highly restore traditional living scenes and practical experiences. For example, through VR equipment, audiences can "participate" in the Qingming Festival canal transportation activities, experiencing the work scenes of boatmen, the prosperity of wharf transactions, and the customs of coastal residents, thereby gaining an immersive understanding of the cultural connotations behind the symbols. AI algorithms can achieve precise matching between communication content and target audiences. By analyzing the cultural background, cognitive habits, and interest preferences of audiences in different regions, personalized communication content and modal combinations can be pushed, improving the accuracy and effectiveness of communication. Blockchain technology can ensure the authenticity and traceability of digital cultural content, protecting the intellectual property rights of cultural symbol communication and encouraging creators to continuously produce high-quality content.

These technological innovations are not only upgrades of communication tools but also fundamentally reshape the internal logic of cross-cultural communication. They enable cultural symbols originally dependent on specific offline scenes to achieve cross-temporal, cross-cultural meaning regeneration and value transmission through multimodal symbol combinations. For example, the virtual Grand Canal space constructed through digital twin technology can transform the core linguistic metaphor of "a bridge of civilization" into a visual, audible, and interactive immersive experience scene. International audiences can "walk" along the virtual canal, observe the architectural styles of ancient wharves, listen to folk music along the route, and even interact with virtual characters (such as ancient boatmen and craftsmen), significantly reducing the cognitive threshold and enhancing emotional resonance. Digital technology has thus become a core driving force for the innovation of multimodal metaphor strategies for the international communication of Grand Canal cultural symbols, providing a solid technical support for breaking through traditional communication bottlenecks.

1.3 Theoretical Background: Integrated Application of Cultural Space and Metaphor Theories

The effective solution to the practical dilemmas of the international communication of Grand Canal cultural symbols requires the support of systematic theoretical frameworks. This study integrates cultural space theory, Conceptual Metaphor Theory (CMT), and Multimodal Metaphor Theory to construct a comprehensive analytical framework, laying a solid theoretical foundation for the design and implementation of communication strategies.

When defining "intangible cultural heritage", UNESCO places special emphasis on the core status of "cultural space", regarding it as the essential form of the existence and inheritance of intangible cultural heritage. Cultural space theory rejects the

static view of culture as an isolated phenomenon and instead focuses on the holistic connection between cultural practices and specific time, space, and social contexts. It emphasizes that culture is not a single symbolic form or behavioral pattern but a dynamic system formed by the interaction of physical environments, behavioral practices, and symbolic meanings. Grand Canal cultural symbols are essentially a three-dimensional organic cultural space integrating physical space (river courses, ancient wharves, coastal buildings, water conservancy facilities), behavioral space (canal transportation skills, canal folk customs, production practices, festival rituals), and symbolic space (values such as harmony and integration, cultural spirits such as perseverance and inheritance, collective memories such as historical events and folk stories).

However, existing research on the international communication of cultural symbols mostly focuses on the design and application of single-modal symbols (such as visual symbols or linguistic expressions), lacking systematic consideration of the integrity of cultural space. This leads to fragmented communication effects, where audiences can only understand individual symbolic forms but cannot grasp the overall cultural connotation and spatial logic behind them, making it difficult to achieve in-depth cross-cultural identity. The introduction of cultural space theory helps to restore the three-dimensional structure of Grand Canal cultural symbols, ensuring that communication strategies are designed based on the holistic connection of physical, behavioral, and symbolic spaces, and avoiding the loss of cultural connotations caused by symbolic fragmentation.

Conceptual Metaphor Theory (CMT), proposed by Lakoff and Johnson (1980), reveals the cross-domain mapping nature of metaphor as a basic human cognitive method. It points out that metaphor is not merely a rhetorical device in language but a core way of human cognition and experience of the world. Humans understand abstract concepts (target domains) through concrete, perceptible concepts (source domains) by establishing systematic cross-domain mappings. This theory provides a core cognitive logic for the cross-cultural translation of cultural connotations. For Grand Canal cultural symbols, their core connotations (such as "cultural integration" and "historical inheritance") are often abstract and culturally specific. By selecting source domains with cross-cultural commonality (such as "bridge", "museum", and "vein") that are familiar to international audiences, metaphorical mappings can be established between abstract cultural connotations and concrete cognitive concepts, building a cognitive bridge for cross-cultural communication and reducing the understanding threshold.

Multimodal Metaphor Theory, developed by Forceville (1996) on the basis of CMT, breaks through the limitations of traditional CMT on linguistic modality. It holds that metaphor can be constructed not only through language but also through multiple modal symbols such as images, sounds, actions, and interactions. Meaning is not only generated within a single modality but also from the interaction, reinforcement, and complementarity between multiple modalities. This theory perfectly adapts to the communication scenarios and audience cognitive habits of the digital age. In the international communication of Grand Canal cultural symbols, abstract metaphorical connotations can be transformed into perceptible and experiential content through the synergistic combination of multiple modalities such as language (metaphorical expressions and interpretations), vision (images, videos, and virtual scenes), hearing (music, environmental sounds, and narrations), and interaction (VR experiences, online co-creation). This not only enriches the expression forms of metaphors but also meets the diverse cognitive and experience needs of international audiences, enhancing the effectiveness of cross-cultural communication.

The organic integration of cultural space theory with CMT and Multimodal Metaphor Theory to construct the analytical framework of "Linguistic Metaphor Anchoring - Three-Dimensional Spatial Adaptation - Multimodal Collaborative Communication" can not only restore the spatial integrity of Grand Canal cultural symbols and ensure the accuracy of cultural connotation transmission but also use metaphor as a cognitive bridge to address cross-cultural cognitive barriers, and rely on multimodal synergy to enhance audience engagement and emotional resonance. This integrated theoretical framework effectively fills the gaps in existing research in terms of theoretical integration and practical guidance, providing a systematic analytical tool for the design and optimization of communication strategies.

2. Theoretical Foundation and Analytical Framework

2.1 Definition of Core Concepts

2.1.1 Grand Canal Cultural Symbols

Grand Canal cultural symbols are a composite cultural symbol system formed in the long-term historical development of the Grand Canal, integrating physical forms, behavioral practices, and symbolic meanings. They are the highly condensed and concentrated embodiment of Grand Canal culture. From the perspective of physical forms, they include tangible carriers such as the Beijing-Hangzhou Grand Canal watercourse, ancient wharves (such as Yangzhou Gudu Wharf and Hangzhou Gongchen Bridge), water conservancy facilities (such as sluices and embankments), and traditional buildings (such as canal-side residences and guild halls). From the perspective of behavioral practices, they include intangible cultural forms such as canal transportation skills, dragon boat racing, canal folk music and dance, and traditional crafts (such as canal stone carving and embroidery). From the perspective of symbolic meanings, they carry core values and cultural spirits such as integration and symbiosis (the mutual exchange and integration of north-south cultures), tenacious inheritance (the continuous inheritance of canal culture across generations), and harmony between humans and nature (the coordinated development of the canal and the ecological environment). These three dimensions are interrelated and organic, jointly constituting the rich connotation and unique charm of Grand Canal cultural symbols.

2.1.2 Linguistic Multimodal Metaphor

Linguistic multimodal metaphor takes linguistic metaphor as the core anchor and integrates multiple modal symbols such as vision, hearing, interaction, and behavior to realize cross-domain mapping between source domains and target domains. In this process, linguistic metaphor plays a core anchoring role, clarifying the logical relationship between the source domain (a concrete, perceptible concept familiar to the audience) and the target domain (the abstract cultural connotation of the Grand Canal). Multiple modal symbols such as vision, hearing, and interaction serve as auxiliary carriers, transforming the abstract metaphorical logic into concrete, perceptible, and experiential content. For example, taking "The Grand Canal is a bridge of civilization" as the core linguistic metaphor, the visual modal can present the image of the canal connecting north and south as a bridge, the auditory modal can play music symbolizing communication and integration, and the interactive modal can allow the audience to "cross" the virtual bridge to experience the cultural customs of both ends, thereby comprehensively conveying the connotation of the Grand Canal as a carrier of cultural integration.

2.1.3 Three-Dimensional Cultural Space

Three-dimensional cultural space, based on cultural space theory, decomposes the communication space of Grand Canal cultural symbols into three interrelated and organically unified dimensions: physical space, behavioral space, and symbolic space. Physical space refers to the concrete geographical environment and tangible carriers of cultural symbols, including the spatial layout of the Grand Canal, the distribution of cultural heritage sites, and the form of tangible cultural relics. It is the material foundation for the existence and communication of cultural symbols. Behavioral space refers to the dynamic practice processes and interactive experiences related to cultural symbols, including the inheritance and display of intangible cultural heritage, audience participation in cultural activities, and interactive communication in digital scenarios. It is the dynamic way for cultural symbols to realize meaning transmission. Symbolic space refers to the abstract value connotations, cultural spirits, and collective memories carried by cultural symbols, including the core values of Grand Canal culture, the historical memories of the nation, and the spiritual pursuit of the community. It is the core essence of cultural symbols and the ultimate goal of international communication.

2.2 Logic of Theoretical Integration

The theoretical foundation of this study is formed by the organic integration of cultural space theory, CMT, and Multimodal Metaphor Theory. The three theories complement each other and jointly provide support for the construction of communication strategies.

Firstly, cultural space theory provides an "overall analytical framework" for the construction of communication strategies. It emphasizes the holistic connection between the three dimensions of physical space, behavioral space, and symbolic space of Grand Canal cultural symbols, ensuring that the design of linguistic metaphors and multimodal symbols always conforms to the spatial essence of cultural symbols. This avoids the problem of fragmented communication caused by focusing only on a single dimension, ensuring that the transmission of cultural connotations is complete and accurate. For example, in the design of metaphors, it is necessary to not only consider the correspondence between the metaphor and the symbolic meaning (symbolic space) but also combine the characteristics of physical space (such as the linear layout of the canal) and behavioral space (such as audience participation methods) to realize the integration of metaphor and cultural space.

Secondly, CMT provides a "cognitive core support" for communication strategies. It solves the problem of cross-cultural cognitive barriers by selecting source domains with cross-cultural commonality. The core connotations of Grand Canal cultural symbols are often abstract and culturally specific, and international audiences lack corresponding cognitive experiences. By selecting source domains such as "bridge", "museum", and "vein" that are familiar to audiences of different cultural backgrounds, metaphorical mappings can be established between abstract cultural connotations and concrete cognitive concepts. This enables international audiences to understand and accept the cultural connotations of the Grand Canal through their existing cognitive frameworks, reducing the difficulty of cross-cultural communication.

Thirdly, Multimodal Metaphor Theory provides a "practical implementation path" for communication strategies. It transforms abstract metaphorical connotations into concrete, perceptible, and experiential content through the synergistic combination of multiple modal symbols. In the digital age, international audiences' cognitive habits are increasingly diverse, and single-modal communication can no longer meet their needs. Through the combination of language, vision, hearing, interaction, and other modalities, the metaphorical connotations can be presented in a multi-dimensional and multi-sensory way. For example, the metaphor "The Grand Canal is a flowing museum" can be realized through the combination of visual (display of cultural relics along the canal), auditory (playing folk music along the canal), and interactive (VR experience of cultural relic appreciation) modalities, enabling audiences to comprehensively perceive the connotation of the metaphor through seeing, hearing, and participating.

The organic integration of the three theories forms a complete theoretical chain from "overall framework - cognitive core - implementation path", providing a solid theoretical support for the construction of multimodal metaphor strategies for the international communication of Grand Canal cultural symbols.

2.3 Three-Dimensional Analytical Framework

Based on the integration of the three theories, this study constructs a three-dimensional analytical framework of "Linguistic Metaphor Anchoring - Three-Dimensional Spatial Adaptation - Multimodal Collaborative Communication", which provides a systematic analytical tool for the design and implementation of communication strategies.

2.3.1 Linguistic Metaphor Anchoring Layer

This layer serves as the cognitive core of the analytical framework, tasked with deconstructing the three-dimensional spatial connotations of Grand Canal cultural symbols and establishing systematic metaphorical mappings. First, it systematically parses the target domains—core connotations across physical, behavioral, and symbolic spaces. For the physical space, the target domain centers on "spatial connectivity and historical continuity," encompassing the canal's linear layout, connection of water systems, and preservation of tangible heritage. For the behavioral space, the target domain focuses on "living practice and interactive inheritance," including the continuation of intangible cultural heritage such as canal transportation skills and folk rituals, as well as audience participation. For the symbolic space, the target domain revolves around "value connotation and cultural spirit," embodying concepts like harmony between humans and nature, north-south integration, and intergenerational inheritance.

Second, based on the principles of cross-cultural cognitive commonality and the accessibility of source domains, this layer selects concrete, universally understood concepts as source domains to construct a core metaphor system covering structural, ontological, and orientational metaphors. Structural metaphors (e.g., "The Grand Canal is a bridge of civilization") establish logical connections between abstract cultural connotations and concrete spatial relationships; ontological metaphors (e.g., "The Grand Canal is a flowing museum") materialize abstract cultural spirits into perceptible entities; orientational metaphors (e.g., "The Grand Canal is the vein of Chinese civilization") leverage spatial orientation cognition to convey the cultural symbol's significance in sustaining civilization. These metaphors not only align with the three-dimensional spatial connotations of Grand Canal cultural symbols but also resonate with the cognitive habits of international audiences, laying a solid foundation for cross-cultural communication.

2.3.2 Three-Dimensional Spatial Adaptation Layer

This layer bridges the linguistic metaphor anchoring layer and the multimodal collaborative communication layer, ensuring that core metaphors are precisely integrated with the physical, behavioral, and symbolic dimensions of cultural space.

For the physical space adaptation, the focus is on aligning metaphors with the canal's tangible spatial characteristics. For example, the structural metaphor "The Grand Canal is a cultural corridor" corresponds to the canal's linear physical layout—by mapping the "corridor's" linear extension and sequential display functions to the canal's north-south span and distributed cultural heritage sites, the metaphor becomes spatially grounded. This adaptation avoids the disconnection between metaphor and cultural space, enabling international audiences to perceive metaphorical connotations through the canal's physical form.

For the behavioral space adaptation, the key is to link metaphors with dynamic practice processes. Taking the ontological metaphor "The Grand Canal is a theater of life" as an example, it aligns with the behavioral space's emphasis on participation and experience. The metaphor maps the "theater's" interactive performance attributes to the canal's folk rituals, production practices, and audience participation activities, transforming abstract metaphorical meaning into actionable behavioral experiences. This allows audiences to grasp cultural connotations through immersive participation rather than passive reception.

For the symbolic space adaptation, the core lies in connecting metaphors with abstract value connotations. For instance, the orientational metaphor "The Grand Canal is the vein of Chinese civilization" maps the "vein's" life-sustaining function to the canal's role in inheriting civilization, promoting cultural integration, and nurturing ecological balance. This adaptation ensures that metaphors accurately convey the symbolic core of Grand Canal cultural symbols, guiding international audiences to recognize the canal's profound value beyond its physical and behavioral dimensions.

2.3.3 Multimodal Collaborative Communication Layer

This layer translates metaphorical connotations, anchored and adapted to three-dimensional space, into concrete, multi-sensory communication content through the synergistic combination of multiple modalities. Drawing on Multimodal Metaphor Theory, it selects and integrates appropriate modal symbols (language, vision, hearing, interaction, etc.) based on the characteristics of different metaphors and communication scenarios, realizing the three-dimensional transmission of metaphorical meaning.

Language modality plays a core explanatory role, using concise and accurate expressions to clarify the logical relationship between source and target domains (e.g., "As a bridge of civilization, the Grand Canal connects north and south cultures"). Visual modality relies on images, videos, and virtual scenes to visualize metaphors (e.g., using aerial footage of the canal winding like a vein or 3D models of bridges spanning the canal). Auditory modality enhances emotional resonance through environmental sounds, music, and narrations (e.g., canal water flow, boatmen's work songs, or music symbolizing harmony and integration). Interactive modality enables audience participation through VR/AR experiences, online co-creation, and other forms (e.g., "crossing" a virtual canal bridge or simulating canal transportation practices).

Different communication scenarios require differentiated modal combinations: international cultural exhibitions prioritize "vision + interaction + hearing" to create immersive experiences; social media platforms emphasize "language + vision" for concise and efficient dissemination; transnational documentaries integrate "language + vision + hearing" for in-depth

interpretation. This scenario-specific modal collaboration maximizes the effectiveness of metaphorical communication, meeting the diverse cognitive and experience needs of international audiences.

3. Construction of the Core Metaphor System for Grand Canal Cultural Symbols

Based on the three-dimensional spatial connotations of Grand Canal cultural symbols and the analytical framework of "Linguistic Metaphor Anchoring - Three-Dimensional Spatial Adaptation," this study constructs a core metaphor system consisting of three types of metaphors, each corresponding to a spatial dimension and forming a mutually complementary, logically coherent system.

3.1 Physical Space-Oriented Structural Metaphors

Structural metaphors establish systematic logical connections between the target domain (physical space connotations of Grand Canal cultural symbols) and the source domain (concrete spatial concepts), helping international audiences understand the canal's spatial characteristics and historical continuity through familiar spatial relationships.

The core metaphor is "The Grand Canal is a bridge of civilization." The source domain "bridge" is universally recognized across cultures, with core attributes of "connecting two ends, overcoming barriers, and promoting communication." This precisely maps to the Grand Canal's physical space connotations: its watercourse connects the five major water systems and north-south regions, breaking geographical barriers; its historical role as a transportation artery promoted material exchange and cultural communication between north and south. For international audiences, the "bridge" is a familiar and positive symbol, enabling them to quickly grasp the canal's core value of "cultural integration and connectivity" without relying on prior cultural background.

The auxiliary metaphor is "The Grand Canal is a cultural corridor." The source domain "corridor" has linear extension and sequential display characteristics, mapping to the canal's physical space attributes: its 1,794-kilometer linear layout forms a continuous cultural landscape, with scattered cultural heritage sites (ancient wharves, sluices, guild halls) like exhibits in a corridor. This metaphor complements the "bridge of civilization" by emphasizing the canal's historical continuity and cultural diversity—just as a corridor connects different rooms, the canal links diverse regional cultures, forming a unique cultural landscape along its route.

3.2 Behavioral Space-Oriented Ontological Metaphors

Ontological metaphors materialize the abstract behavioral space connotations of Grand Canal cultural symbols into concrete, perceptible entities (source domains), reducing the cognitive difficulty of understanding "living inheritance" and "participatory practice."

The core metaphor is "The Grand Canal is a flowing museum." The source domain "museum" is a globally familiar cultural institution, with core functions of "collecting cultural heritage, displaying historical value, and inheriting collective memory." This maps to the Grand Canal's behavioral space connotations: the canal "collects" intangible cultural heritage such as canal transportation skills, dragon boat racing, and folk crafts; its historical evolution and cultural practices are like "exhibits" displaying the development of Chinese civilization; its intergenerational inheritance of culture aligns with the museum's mission of preserving and passing on heritage. International audiences, familiar with institutions like the Louvre and the British Museum, can easily understand the canal's "living heritage" attribute through this metaphor—unlike static museums, the canal's "exhibits" are dynamic practices integrated into daily life.

The auxiliary metaphor is "The Grand Canal is a theater of life." The source domain "theater" emphasizes "live performance, audience participation, and scene reproduction," mapping to the Grand Canal's behavioral space characteristics: the production and living practices of residents along the canal (fishing, boat-making, folk festivals) are like "performances" reflecting life; international audiences can "participate" in these "performances" through digital experiences or on-site visits; the canal's historical scenes (ancient 漕运, wharf transactions) can be "reproduced" through digital technology. This metaphor enhances the canal's affinity, conveying that its culture is not a distant historical relic but a vivid, participatory "theatrical performance" that continues to unfold.

3.3 Symbolic Space-Oriented Orientational Metaphors

Orientational metaphors rely on universal spatial orientation cognition (e.g., up/down, inside/outside, continuity/interruption) to convey the abstract symbolic connotations of Grand Canal cultural symbols, leveraging intuitive spatial experiences to trigger cross-cultural emotional resonance.

The core metaphor is "The Grand Canal is the vein of Chinese civilization." The source domain "vein" (human or biological) has core attributes of "running through the whole body, nourishing vitality, and maintaining system integrity." This multi-dimensional mapping to the canal's symbolic space connotations: physically, it corresponds to the canal's water system network nourishing coastal regions; culturally, it symbolizes the canal's role in inheriting Chinese civilization, connecting north-south cultural traditions and maintaining cultural continuity; ecologically, it reflects the "harmony between humans and nature"

concept of the canal coexisting with the ecological environment. The human "vein" is a universal cognitive concept across cultures, enabling international audiences to intuitively understand the canal's fundamental significance to Chinese civilization—just as veins sustain life, the canal sustains the development of Chinese culture.

The auxiliary metaphor is "The Grand Canal is a river of history." The source domain "river" has attributes of "flowing forward, accumulating memories, and nurturing life," mapping to the canal's symbolic connotations: its thousands of years of flow symbolize the continuity of Chinese history; its accumulation of cultural relics, folk customs, and historical events is like a river accumulating sediment, recording civilizational development; its nurturing of coastal cities and people reflects its role as a "cradle of civilization." This metaphor strengthens the canal's historical depth, conveying that it is not only a physical watercourse but also a carrier of historical memory and civilizational inheritance, flowing through time to connect the past, present, and future.

4. Linguistic Multimodal Metaphor Communication Strategies Based on Three-Dimensional Space

Guided by the core metaphor system and analytical framework, this study proposes three targeted communication strategies corresponding to the physical, behavioral, and symbolic dimensions of cultural space. These strategies integrate digital technologies such as GIS, VR, and AI to realize the synergistic transmission of metaphors and multimodal symbols, addressing practical challenges in international communication.

4.1 Physical Space Dimension: Constructing Metaphorical Spatial Corridors to Realize Cross-Temporal and Cross-Spatial Scene Reproduction

This strategy focuses on the physical space-oriented structural metaphors ("bridge of civilization," "cultural corridor"), leveraging digital technology to reconstruct the canal's physical space and realize the visualization and experiential transmission of metaphors.

The core implementation path is to build a Grand Canal digital twin corridor by integrating GIS, 3D modeling, and historical data. First, high-precision geographic data of the canal is collected and integrated with historical maps and documents to construct a digital twin model covering the entire Beijing-Hangzhou Grand Canal. This model reproduces the canal's physical space in detail, including ancient wharves, water conservancy facilities, and coastal landscapes, realizing cross-temporal reproduction of the physical space. Second, metaphorical elements are embedded in the digital twin corridor to visualize structural metaphors. For the "bridge of civilization" metaphor, key connection points along the canal are designed as "virtual cultural bridges," displaying cultural exchange stories through interactive pop-ups. For the "cultural corridor" metaphor, the digital twin corridor is divided into thematic sections, with each section displaying corresponding cultural heritage sites and historical scenes in sequence, like exhibits in a corridor. Third, multi-modal interaction is added to enhance audience engagement. International audiences can roam the digital twin corridor through mobile terminals or VR equipment, freely switching between historical and contemporary perspectives. AR technology is used to connect virtual and physical spaces: when visiting real canal heritage sites, audiences can scan with mobile phones to overlay virtual historical scenes and metaphorical interpretations.

This strategy addresses the challenge of original spatial context rupture by digitally reconstructing the canal's physical space, enabling international audiences to intuitively perceive the metaphors of "bridge" and "corridor" through immersive spatial experiences, and grasp the canal's spatial connectivity and historical continuity.

4.2 Behavioral Space Dimension: Creating Embodied Metaphor Theaters to Strengthen Participatory Interaction

This strategy centers on behavioral space-oriented ontological metaphors ("flowing museum," "theater of life"), focusing on audience participatory experience and using digital technology to transform metaphorical connotations into tangible behavioral practices.

The core implementation path is to build an embodied metaphor theater integrating motion capture, VR, and AI technologies, enabling audiences to "participate" in the canal's cultural practices and deeply experience metaphorical connotations. For the "flowing museum" metaphor, a VR-based "Grand Canal Living Heritage Experience Hall" is developed: audiences wear VR equipment to "enter" the canal's historical scenes, such as participating in Qingming Festival activities or appreciating intangible cultural heritage displays up close. The system uses motion capture technology to track audience movements, providing real-time feedback and explanations.

For the "theater of life" metaphor, interactive experience projects are designed to stimulate audience participation. Offline, "Canal Cultural Experience Workshops" are set up at international cultural festivals, inviting audiences to experience dragon boat making, folk music performances, and other activities, transforming metaphorical "theatrical performances" into hands-on practice. Online, an AI-based interactive platform is launched: audiences can use motion sensing technology to simulate canal folk dances or other activities, with the system generating personalized evaluation reports and cultural explanations; through live-streamed "canal life shows," inheritors demonstrate daily production practices, inviting online audiences to interact and ask questions, realizing real-time participation in the "theater of life."

Additionally, biosensors and AI motion recognition are integrated to enhance the scientificity of embodied experiences. The system records audience muscle activation patterns and movement rhythms during VR experiences or workshop participation, comparing them with traditional skill standards to generate personalized improvement suggestions. This not only improves the experience's interactivity but also helps audiences deeply understand the technical connotations and cultural significance behind the canal's behavioral practices, transforming passive metaphor acceptance into active embodied experience.

4.3 Symbolic Space Dimension: Cultivating Co-Creative Metaphor Communities to Promote Cross-Cultural Value Resonance

This strategy focuses on symbolic space-oriented orientational metaphors ("vein of Chinese civilization," "river of history"), aiming to promote cross-cultural value resonance by building digital communities and encouraging co-creation, transforming metaphorical connotations into shared cultural consensus.

The core implementation path is to cultivate a co-creative metaphor community on global social media platforms, integrating multi-language interpretation, creative content production, and cross-cultural interaction. First, multi-language metaphor interpretation content is released to clarify symbolic connotations: short videos explain the "vein of Chinese civilization" metaphor (comparing canal water flow to human blood circulation, visualizing the canal's role in nourishing civilization); infographics interpret the "river of history" metaphor (mapping the canal's historical development to a river's flow, marking key historical events and cultural milestones). Second, co-creation activities are launched to encourage global audience participation. The "My Canal Story" campaign invites audiences to share stories related to rivers or cultural heritage, with official accounts integrating these stories into the "river of history" metaphor narrative. The "Metaphor Creative Challenge" encourages audiences to re-create canal metaphors through short videos, posters, or music, selecting outstanding works for promotion and dissemination. Third, a cross-cultural dialogue mechanism is established to promote value resonance. Online seminars and live broadcasts are held, inviting cultural scholars, heritage inheritors, and international audiences to discuss the canal's cultural value. The discussion focuses on universal values embodied in metaphors, guiding international audiences to associate the canal's symbolic connotations with their own cultural values, forming cross-cultural consensus.

This strategy addresses the challenge of cross-cultural cognitive barriers by transforming one-way metaphor transmission into community-based co-creation and dialogue, enabling international audiences to actively participate in metaphor interpretation and value construction, and achieving deep resonance with the canal's symbolic connotations.

4.4 Three-Dimensional Collaborative Mechanism: Realizing a Cross-Scenario Communication Closed Loop

The three strategies—metaphorical spatial corridors, embodied metaphor theaters, and co-creative metaphor communities—operate as an organic and dynamically synergistic ecosystem rather than isolated approaches, reflecting the interdependent nature of the physical, behavioral, and symbolic dimensions of cultural space. This synergy enhances communication effectiveness by forming a closed loop that connects the virtual and the real, cognition and experience, as well as individuals and communities.

First, the metaphorical corridor in the physical space provides a foundational spatial context for the embodied theater in the behavioral space. The meticulously reconstructed historical scenes and cultural heritage sites within the digital twin corridor serve as immersive backdrops for VR experiences and offline workshops. For example, when audiences engage in VR canal transportation simulations "enter" the virtual canal environment of the digital twin corridor, where the spatial layout of docks, waterways, and surrounding buildings aligns with historical records. This alignment enhances the authenticity of the embodied experience, allowing audiences to not only simulate boatmen's operations but also perceive the spatial logic of the canal's transportation system, thereby deepening their understanding of the "bridge of civilization" metaphor. Second, the embodied experience in the behavioral space strengthens audience engagement with the metaphors in the symbolic space. Passive cognitive understanding of metaphors is transformed into emotional identification through hands-on participation. When audiences simulate dragon boat racing in the embodied theater, for instance, they physically experience the coordination, teamwork, and ritualistic spirit of the activity, and these bodily sensations resonate with the symbolic connotations of "unity" and "cultural inheritance" embedded in the "vein of civilization" metaphor. Similarly, participating in canal craft workshops enables audiences to grasp the "living heritage" essence of the "flowing museum" metaphor through tactile and creative engagement, moving beyond abstract conceptualization. Third, the co-creative community in the symbolic space feeds back and enriches content for the physical and behavioral spaces. User-generated content (UGC) from the community—including creative videos visualizing the "river of history" metaphor, personal stories linking local rivers to the Grand Canal, and adapted versions of canal folk music—is curated and integrated into the digital twin corridor as interactive nodes. For example, a UGC animation comparing the Grand Canal's water flow to human blood circulation may become a pop-up exhibit in the metaphorical corridor, enhancing the visual transmission of the "vein of civilization" metaphor. Additionally, audience feedback from community discussions informs updates to the interactive modules of the embodied theater, ensuring the strategies remain responsive to audience needs.

Complementing this loop is a data-driven feedback optimization mechanism. User behavior data, such as navigation paths in the digital twin corridor, participation duration in VR experiences, and engagement levels with community co-creation activities, is analyzed to refine the three strategies. If data indicates low interaction with the "cultural corridor" section of the digital twin, for instance, the visual modality is enhanced by adding 360-degree panoramic views of cultural heritage sites; if community members request more accessible metaphor explanations, the language modality is adjusted to use simpler terminology and more vivid examples. This iterative optimization keeps the communication system dynamic and adaptive, aligning with the evolving logic of digital cultural space.

5. Practical Challenges and Optimization Paths

5.1 Core Challenges

While the proposed multimodal metaphor strategies address key dilemmas in the international communication of Grand Canal cultural symbols, their practical implementation faces three critical challenges that echo the spatial and technological tensions emphasized in cultural space theory.

Despite the selection of cross-culturally common source domains, subtle cultural differences in metaphorical connotations may lead to misinterpretation. For example, the "museum" source domain, while globally recognized, emphasizes the preservation of art and artifacts in Western contexts, whereas the Grand Canal's "flowing museum" metaphor highlights dynamic and living cultural practices. This disconnect may cause some international audiences to reduce the canal's cultural significance to a static collection of relics, overlooking its "living heritage" essence. Similarly, the "vein" metaphor, rooted in universal bodily cognition, may evoke different associations across cultures—some cultures may link it solely to biological functions, missing its symbolic role in sustaining civilization.

In digital communication practice, there is a tendency to over-rely on visual and interactive modalities at the expense of auditory and linguistic modalities. This imbalance weakens the depth of metaphorical transmission: visual and interactive elements excel at creating immersion but may fail to articulate the logical connection between source and target domains. A VR experience of crossing a "virtual cultural bridge," for instance, may impress audiences with its realism but leave them uncertain about the bridge's symbolic link to the canal's cultural integration function. Additionally, linguistic explanations are often overly concise or culturally specific, failing to bridge cognitive gaps for audiences unfamiliar with Chinese culture.

Digital technologies enable immersive spatial reconstruction but face accessibility barriers—audiences in regions with limited internet infrastructure or low-cost access to VR devices cannot engage with core experiences, excluding them from the communication loop. Conversely, over-reliance on technology risks diluting cultural authenticity: digital simulations of canal scenes or behavioral practices may simplify complex historical and cultural contexts to fit technical constraints. This "technological simplification" can reduce the canal's cultural space to a superficial virtual spectacle, undermining the goal of meaning reproduction.

5.2 Optimization Paths

To address these challenges, the optimization paths align with the "three-dimensional spatial reconstruction" logic of cultural space theory, focusing on metaphorical refinement, multimodal balance, and inclusive technological application.

We can establish a "metaphorical connotation calibration framework" that integrates cross-cultural semantic analysis and audience feedback. For source domains with potential cultural gaps, add context-specific explanatory notes (e.g., "The Grand Canal's 'flowing museum' is not just a collection of relics—it preserves dynamic practices passed down through generations, similar to a living theater"); supplement core metaphors with culturally familiar analogies (e.g., comparing the canal's "cultural corridor" to the Silk Road's role in connecting civilizations, a reference recognizable to many international audiences); and conduct pre-testing of metaphorical expressions with diverse cultural groups to identify and adjust for unintended associations.

We can redesign modal combinations to ensure each modality reinforces the metaphor's core logic. For the linguistic modality, develop layered explanations—concise captions for social media and in-depth audio narrations for VR/AR experiences (detailing how the canal "nourishes" culture like veins nourish the body). For the auditory modality, integrate context-rich sounds to strengthen metaphorical emotions—use soft, flowing music for the "river of history" metaphor and rhythmic, collaborative sounds for the "bridge of civilization" metaphor. Prioritize scenario-specific modal combinations: for low-tech environments, emphasize "language + auditory + basic visual" combinations to ensure effective metaphorical transmission without relying on advanced technology.

We can adopt a "technological stratification" approach to balance accessibility and authenticity. For the high-tech tier, enhance authenticity in VR/AR experiences for regions with robust digital infrastructure by integrating local historical records, oral histories from canal communities, and regional cultural details. For the mid-tech tier, develop web-based, low-bandwidth alternatives accessible via mobile devices. For the low-tech tier, create offline materials that replicate key metaphorical connections—for example, a booklet using diagrams to link the "bridge" metaphor to the canal's historical trade routes, or a workshop teaching simple canal folk dances to embody the "theater of life" metaphor. Additionally, establish an "authenticity oversight mechanism" involving cultural heritage experts, local canal communities, and historians to review digital content, ensuring technical simulations preserve the integrity of the canal's physical, behavioral, and symbolic spatial dimensions.

6. Conclusion

This study integrates cultural space theory, Conceptual Metaphor Theory, and Multimodal Metaphor Theory to construct a systematic framework for the international communication of Grand Canal cultural symbols. By decomposing the canal's cultural space into physical, behavioral, and symbolic dimensions and anchoring each dimension with cross-culturally resonant metaphors, the proposed strategies—metaphorical spatial corridors, embodied metaphor theaters, and co-creative metaphor communities—address the core dilemmas of contextual rupture, cognitive barriers, and low engagement in cross-cultural communication.

The key insight is that effective international communication of cultural symbols requires more than technical dissemination—it demands the reconstruction of cultural space in the digital realm. The three-dimensional synergistic mechanism, which links physical spatial reproduction, behavioral embodied experience, and symbolic value co-creation, enables the Grand Canal's cultural symbols to transition from "one-way representation" to "cross-cultural symbiosis," a transformation central to living heritage transmission. Through this mechanism, linguistic metaphors act as cognitive bridges, multimodal symbols serve as experiential carriers, and digital technology functions as a spatial reconstruction tool, collectively realizing the cross-temporal and cross-cultural reproduction of the canal's cultural meaning.

This study enriches the theoretical application of cultural space theory in cross-cultural communication, demonstrating how spatial integrity can be preserved and activated in digital contexts. Practically, it provides a scalable framework for the international communication of other Chinese cultural symbols—such as the Forbidden City or Kunqu Opera.

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