



# Study on Extraction and Genealogical Construction of Henan "Cultural Genes" of Yellow River and their Educational Dissemination Pathways

Yongtao Zhao <sup>a</sup>, Yihan Ke <sup>b\*</sup>

<sup>a</sup> Candidate of Phd., Faculty of Fine-Applied Arts and Cultural Science, China

<sup>b</sup> Mahasarakham University, Faculty of Fine-Applied Arts and Cultural Science, 44150, Thailand

---

## Abstract

This study applies the cultural gene theory to preserving and inheriting Henan Yellow River cultural heritage, aiming to provide insights for the thorough exploration and optimal utilization of Yellow River cultural heritage resources. The extraction of Henan Yellow River cultural genes follows a process akin to extracting product genes in biological, genetic engineering. Utilizing reverse translation of instances of Henan Yellow River cultural elements and reverse transcription of instance populations, the Henan Yellow River cultural genes are extracted. A genealogy for constructing Henan Yellow River cultural heritage is established through the associative construction of genetic elements. The cultural genes are categorized and organized into three types which are core genes, ancillary genes, and hybrid genes. Tailored educational and communicative strategies can be adopted for different gene types, thereby offering a reference for the inheritance and preservation of Henan Yellow River cultural heritage and facilitating practical applications in relevant domains.

**Keywords:** Yellow river; cultural genes; extraction; genealogical construction

---

© 2016 IJCI & the Authors. Published by *International Journal of Curriculum and Instruction (IJCI)*. This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (CC BY-NC-ND) (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## 1. Introduction

The term "cultural genes" embodies an intrinsic force that shapes cultural distinctiveness and serves as a fundamental connector in the intergenerational transmission of culture. General Secretary Xi Jinping has repeatedly employed concepts such as "genes," "cultural genes," and "spiritual genes" to expound upon China's traditional culture. On October 8, 2021, the Central Committee of the Communist Party of China and the State Council issued the "Outline of Ecological Protection and High-Quality Development Plan for the Yellow River Basin," emphasizing the imperative of

---

\* Corresponding author: Ke Yihan. ORCID ID.: <https://orcid.org/0000-0000-0000-0000>  
E-mail address: [yihan.k@msu.ac.th](mailto:yihan.k@msu.ac.th)

diligently inheriting the cultural genes of the Yellow River. Spanning a total length of 711 kilometers within Henan province, the main course of the Yellow River passes through eight provincial municipalities and counties, including Sanmenxia, Luoyang, Jiyuan, Zhengzhou, Jiaozuo, Xinxiang, Kaifeng, and Puyang (hnb.yrcc.gov.cn, 2023). This region has left invaluable cultural heritage, constituting an integral facet of China's exceptional traditional culture. The implementation of the significant national strategy for ecological protection and high-quality development within the Yellow River Basin marks the commencement of the "Yellow River Era" and the rise of the Central Plains. Effectively harnessing the extensive and profound cultural resources along the Henan stretch of the Yellow River, unearthing the temporal value enshrined within Yellow River culture, and revitalizing and elevating Henan's Yellow River cultural heritage to tell the compelling "Yellow River Story" all represent a crucial mission and imperative task bestowed upon us in this new era.

This paper endeavors to introduce the genetic concept from biological genetics, employing the notion of "cultural genes" as the fundamental genetic unit. It delves deeply into the cultural resources along the Henan stretch of the Yellow River, constructs a genealogical lineage chart of Henan's Yellow River culture, categorizes gene types, and presents pertinent application strategies. Ultimately, this study offers a reference for the comprehensive exploration and optimal utilization of Henan's Yellow River cultural heritage resources.

## **2. Literature Review**

### *2.1 Research on "cultural genes"*

The concept of "genes" originates from biological genetics, constituting the fundamental units underlying the genetic evolution of organisms (Robert, 2000). The term "cultural genes" emerges through an analogy drawn with biological genetic genes and is also referred to as "memes" in Western countries. Just as Darwin's theory of evolution initiated the study of genetic genes in biological genetics, the "meme theory" has inaugurated humanity's exploration and investigation into cultural evolution and inheritance patterns. Western scholars contend that "memes" inherently harbor diverse

cultural information, encompassing the mechanisms of cultural dissemination and evolution. In recent years, the concept of cultural genes has garnered increasing attention from various disciplines as scholars across different fields have become curious about the relationship between cultural genes and biological genes and the impact and role of cultural genes in preserving and transmitting culture. This paper begins by elaborating on the origin and essence of cultural genes as its focal point of discussion.

### *2.2 The western "meme theory"*

The term "meme" was coined through a deliberate analogy with "gene," originating in the 1970s. Renowned British ethologist Richard Dawkins (1976) introduced this neologism in his famous work "The Selfish Gene," defining "meme" as a "unit of cultural transmission and imitation." He employed the concept to elucidate the patterns of cultural evolution and dissemination. Subsequently, this concept underwent extensive scrutiny across various disciplines. Notably, foundational figures in sociobiology, such as Edward O. Wilson and physicist Charles Lumsden, jointly proposed the "Gene-Culture Coevolution" theory. In this framework, they introduced the term "cultorgen," defining it as the "fundamental unit of heredity in cultural evolution" (Gene et al., 1981). For convenience in research and discourse, the term "meme" was uniformly adopted and popularized in Western nations to represent the fundamental unit of cultural transmission. In 1988, the Oxford English Dictionary included the term "meme," defining it as follows: "Meme: An element of culture that may be considered to be passed on by nongenetic means, especially imitation." Consequently, "meme" has become a significant concept in meme theory and sociobiology.

### *2.3 China's "cultural gene theory" (cene)*

The conceptual definition of cultural genes among Chinese scholars remains subject to considerable contention. Various perspectives have emerged, encompassing philosophical, cultural-historical, ethnological, and cultural anthropological angles. Scholars such as Liu Changlin (1990) have explored social and cultural evolutionary theories through the lens of cultural genes. On the other hand, Liu Zhihui (1998) has discussed the significance of cultural genes from the standpoint of cultural transmission. Xu Jieshun (2008) and others in ethnology and cultural anthropology have delved into

the inherent factors within human cultural structures by studying cultural genes. In his work "Reflections on Several Issues Concerning Contemporary Chinese New Cultural Genes" (2001), Bi Wenbo represents the prevailing viewpoint among domestic scholars by defining "cultural genes" as follows: "Inherent in various cultural phenomena, possessing fundamental concepts or basic spirits capable of inheritance and expansion over time and space, as well as the fundamental styles of cultural expression or forms of manifestation endowed with this ability, are referred to as 'cultural genes'."

In recent years, an increasing number of scholars from a wide array of disciplines, including literature, philosophy, history, law, political science, ethics, communication studies, architecture, medicine, economics, and geography, have adopted the concept of 'cultural genes' to elucidate and explain phenomena and issues within their respective research domains. This interdisciplinary adoption has significantly expanded the scope of research in "cultural genes."

#### *2.4 Cultural gene lineage*

A cultural gene lineage involves the systematic arrangement, combination, and hierarchical deconstruction of cultural elements based on their respective attributes and inherent logic. This results in a sequential and comprehensive map capable of recording cultural information. Research within domestic cultural gene lineages primarily encompasses cultural geography and anthropology (Zhao et al., 2014). In the article "Construction of Cultural Gene Lineage and Research on Inheritance Paths: A Case Study of Ancient Dian State's Cultural Gene" by Zhao, Wang, Yuan, and Ma (2014), the deconstruction of material and non-material cultural genes in regional culture is undertaken to construct a cultural gene lineage, and suitable inheritance paths are proposed from the modes of cultural strategic grafting, cultural symbol implantation, and cultural ecological conservation.

In the paper "Comprehensive Protection of Ethnic Cultural Heritage from the Perspective of Cultural Gene Inheritance" by Li, Ren, and Geng (2021), a cultural gene lineage map for the Lahu ethnic group in South America is depicted. The study proposes an approach for the comprehensive protection of cultural gene maps involving precise identification, external development relying on sociogenetic behavior, and the virtuous

recombination path toward value enhancement. Certain scholars have explored the practical application of cultural genes by constructing cultural gene lineages. In the article "Extraction and Analysis of Regional Cultural Genes in the Yangshan Coastal Ocean Culture Tourism Resort" by Li, Wang, and Song (2017), a cultural gene lineage for Ningbo City, Zhejiang Province, based on the Yangshan Coastal Ocean Resort, is delineated. The study explores the feasibility of transforming cultural resources into cultural capital through the direct implantation of cultural symbols, abstract grafting, and functional transformation.

In the paper "Genealogy of Urban Multiculturalism and Its Value-oriented Inheritance: A Case Study of Tianjin" by Xi, Liu, and Wang (2019), a cultural gene lineage for Tianjin is presented. It summarizes a value-oriented inheritance path from cultural gene value to urban cultural capital, from cultural gene conservation to urban cultural innovation, and from the mode of cultural gene transformation to the development and utilization of cultural capital. Furthermore, in the article "Research on Design of Qingdao Cultural Creative Products Based on Evaluation of Marine Cultural Gene" by Yang, Wang, and Zhang (2019), a cultural gene lineage is constructed for Qingdao's marine culture by synthesizing material and non-material cultural elements. The study asserts that cultural genes serve as a bridge between culture and creation in the design of Qingdao's marine cultural creative products, thereby driving the development of the cultural industry.

### *2.5 "Cultural Genes" and heritage conservation*

Current research on cultural genes primarily focuses on their origin, essence, preservation, and development. The study subjects are mainly centered around historical districts, urban areas, villages, and settlements. However, research-oriented explicitly towards protecting and inheriting Yellow River cultural heritage from the "cultural genes" perspective remains nascent. Concurrently, foreign research on cultural gene theory has achieved a relatively mature status, and domestically, numerous cases have employed this theory to explore cultural inheritance.

These instances further underscore the targeted and feasible application of cultural gene theory in the context of Henan's Yellow River cultural heritage conservation. Hence,

this article employs the "cultural gene" theory to reevaluate the hydro-cultural heritage of the Yellow River, dissecting the cultural genes of Henan's Yellow River region and employing novel concepts to guide the conservation of hydro-cultural heritage. By doing so, it offers a fresh perspective for advancing research in the field of heritage preservation. The definition of "cultural genes" in this paper is predicated on acknowledging that cultural genes, like biological genes, possess replicable elements. Their transmission is analogous to genetic transfer, while their development mirrors genetic evolution (Pei, 2018).

This study employs the meme theory to analyze and extract the cultural genes embedded within Henan's Yellow River cultural heritage. A transmission model, "Cultural Genes-Water Culture," is constructed by harnessing the self-replicating and propagating attributes inherent to cultural genes. This model investigates the role and significance of cultural genes in preserving hydro-cultural heritage. It offers a foundation and reference for delineating the characteristics and types of Henan's Yellow River cultural heritage. Concurrently, the heritage preservation process ensures the adequate inheritance of Henan's Yellow River cultural genes, providing a referential basis and direction for the protection and continuity of cultural genes. It is believed that the integration of the cultural gene concept can not only deepen, refine, and substantiate the research on Yellow River cultural heritage preservation but also enhance the comprehension of the rich connotations and core features of Yellow River culture from a cultural perspective for governmental authorities, planners, and designers. This gives researchers a more comprehensive, robust, and traceable basis for identification and distinctiveness. Consequently, it facilitates the preservation of distinctive attributes while accentuating its unique features, thus ensuring the perpetual existence of China's exceptional cultural genes.

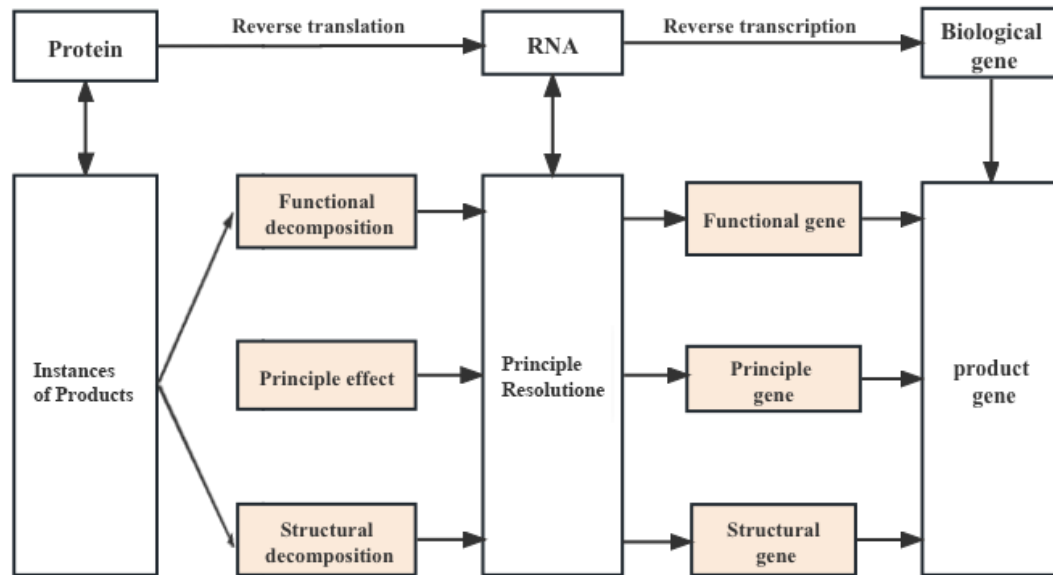
### **3. Methodology**

This study draws inspiration from reverse transcription utilized in molecular genetics, analogous to the extraction of product genes in biotechnological processes. In alignment with this approach, the cultural genes of Henan's Yellow River heritage are

extracted through a process that involves reverse translation of cultural elements specific to the region and reverse transcription from instances within the cultural population.

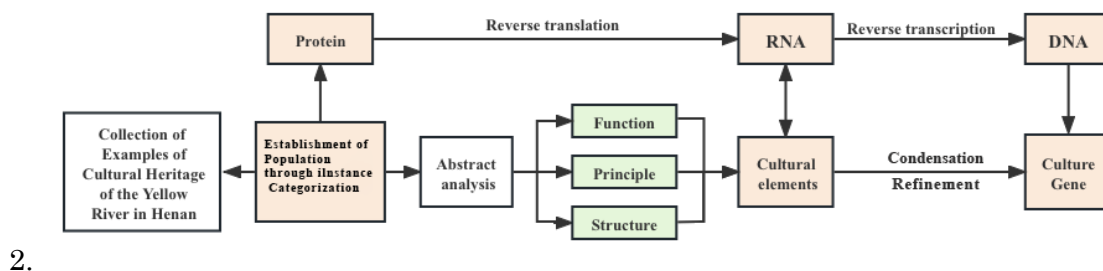
*3.1 Reverse transcription extraction method*

In biological gene extraction, reverse transcription involves the synthesis of DNA catalyzed by reverse transcriptase using RNA as a template, ultimately yielding biological genes (Feng et al., 2002). The concept of "reverse engineering" was initially introduced to establish a method for extracting product genes, and this "reverse engineering" approach has since found application in the extraction of product genes (Tai & Zhong, 2007). This thinking has further led to the developing of the reverse transcription extraction method for product genes. In molecular genetics, the composition of biological genes is determined by the encoding and arranging of base pairs A, G, C, and T. Given the knowledge of the associated proteins, the acquisition of biological genes can be achieved through reverse transcription. Analogously, product genes encompass three fundamental elements: functionality, principles, and structure. When specific instances of products are known, the acquisition of product genes can be accomplished through reverse transcription. The reverse transcription process is illustrated in Figure 1.



*Figure 1: Diagram of the Process for Extracting Product Genes*

Extraction of Cultural Genes bears similarity to the extraction of biological genes, where the reverse transcription process for product genes essentially involves analyzing product instances and extracting product genes from them. Cultural genes are embedded within cultural elements, representing their essence and concentration. In analogy to the reverse transcription of product genes, the reverse transcription of Henan's Yellow River cultural genes can be derived through the analysis of Yellow River cultural elements. Henan's Yellow River cultural heritage corresponds to the product instances in the process of product gene extraction, wherein the abstract analysis of a particular cultural heritage reveals its encompassed cultural elements with distinct functionalities—akin to the "principle set" of Yellow River cultural heritage (analogous to RNA in molecular genetics). Corresponding cultural genes are obtained by condensing and refining cultural elements (akin to reverse transcription in molecular genetics), as depicted in Figure



*Figure 2: Diagram Depicting the Process of Extracting Genetic Information from the Yellow River Culture in Henan Province*

### 3.2 Extraction of Henan's Yellow River cultural genes

#### 3.2.1 Data collection of product element instances

The collection of instance elements from Henan's Yellow River cultural heritage should center around the keyword "Yellow River," employing the degree of relevance and correlation between a particular cultural heritage and the "Yellow River" as critical indicators for aggregation and organization. Based on their respective degrees of association with the Yellow River, these instances can be classified into three major categories: Firstly, legacies formed as a result of the Yellow River itself and human



activities directly impacting it, encompassing ancient riverbeds formed by the Yellow River and various heritage components directly related to its course. Secondly, cultural heritage arises from the practice of Yellow River management, though not directly linked to the river itself. Thirdly, stories and spiritual aspects were created and distilled during the process of Yellow River management (indirectly shaped cultural heritage arising from the Yellow River itself) (Wang, 2022).

Through field investigations, visits, and literature reviews, over 200 cultural element instances have been gathered, including landmarks such as the Xiaolangdi Water Control Hub, the Sanmenxia Large-scale Water Control Hub, Honggou, Xingze, Putianze, Yu River Ancient Course, Ming-Qing Yellow River Ancient Course, Lin Gong Dike, Yubei and Yudong Ancient Dikes, Zhenggong Joint Spillway Monument, Yuba Monument, Yuwang Monument, Tongwa Xiang Cut-off and Diversion Site, Huayuan Kou Bako Site, and Liu Deng's Crossing Site for Army's River Crossing, Jidu Temple, Yuwang Temple, Longma Futu Temple, Jiaying Temple, Suoshuoge, Dadu Mountain Cliff Buddha and Inscriptions, Shuimo Rock in Dongliuwo Village of Mianchi, Yellow River Chants, Yellow River Embankment Construction, Zhenhe Iron Rhinoceros, "Illustration of Yu the Great's Water Management," "Ancient and Modern Illustration of the Yellow River Mouth," Han Portrait Stone "Yu the Great's Water Management," Yuwang Locking the Jiao Well, Yellow River Stringing, The Legend of the River Map and Luo Book, The Grand Yu Sacrificial Ceremony, etc.

### 3.2.2 Construction of instance populations

According to the definitions provided by the "World Heritage Convention" and the State Council's "Notice on Strengthening the Protection of Cultural Heritage," cultural heritage is primarily categorized into tangible and intangible cultural heritage. Tangible cultural heritage can be classified as immovable and movable (Wang, 2010). Based on international and domestic classification systems, four instance populations are established: immovable water cultural heritage, movable water cultural heritage, intangible water cultural heritage, and Yellow River management culture. These populations encompass hydraulic engineering, ancient sites, historic buildings, stone carvings, modern and contemporary significant sites and representative structures,

hydraulic literature, hydraulic art objects, water-related artifacts, folk hydraulic literature, performing arts, traditional hydraulic techniques, social customs and festivals, river management legends, and Yellow River stories, comprising 14 categories (refer to Table 1). The purpose of constructing these populations is to facilitate population analysis, which enables the identification of the critical elements within Henan's Yellow River cultural heritage.

*Table 1: Instances of Population in the Yellow River Culture of Henan Province*

Types	Carriers
Populations	Immovable water cultural heritage, movable water cultural heritage, intangible water cultural heritage, and Yellow River management culture
Populations	Hydraulic engineering, ancient sites, historic buildings, stone carvings, modern and contemporary significant sites and representative structures, hydraulic literature, hydraulic art objects, water-related artifacts, folk hydraulic literature, performing arts, traditional hydraulic techniques, social customs and festivals, river management legends, and Yellow River stories

3.2.3 Data analysis population analysis (reverse translation): extraction of cultural elements

The specific process of population analysis involves abstract extraction of cultural elements through analyzing and deciphering the population's element groups, completing the reverse translation process from instances to elements. Referring from the connotations of biological genes and principles from the field of geography can be deduced through analysis and research that the core elements (analogous to the "original principles" in genetic engineering) of Henan's Yellow River cultural heritage comprise hydraulic engineering, ancient architecture, stone carvings, modern and contemporary significant sites and representative structures, hydraulic literature, hydraulic art objects, folk hydraulic literature, performing arts, traditional hydraulic techniques, social customs, and festive practices, representing carrier cultures.

### 3.2.4 Reverse transcription: extraction of Henan Yellow River cultural genes

The concentration and refinement of cultural elements represent a crucial stage in extracting the cultural genes of Henan's Yellow River. Cultural genes are inherent within cultural elements, embodying the essence and refinement of these elements. From this perspective, the cultural genes of Henan's Yellow River are concealed within its cultural elements, constituting the most concentrated and distilled aspects of these elements. When extracting cultural genes from Henan's Yellow River cultural heritage, the following principles should be adhered to: the principle of intrinsic uniqueness, the principle of extrinsic uniqueness, the principle of local uniqueness, and the principle of overall superiority. The principle of intrinsic uniqueness pertains to the distinctive intrinsic characteristics of Henan's Yellow River; extrinsic uniqueness relates to the distinct outward features unique to Henan's Yellow River; local uniqueness refers to crucial elements exclusive to Henan's Yellow River and absent in other regions; and the principle of overall superiority encompasses elements not exclusive to Henan's Yellow River but demonstrating relative superiority compared to other areas. Through analysis and extraction transformation of the carriers of cultural elements, the cultural genes are obtained.

## 4. Results

### 4.1 Construction of Henan Yellow River cultural gene lineage

Similar to how genetic DNA carries the reproduction of organisms, akin to biological genes, cultural genes represent the genetic code for cultural transmission and continuity. To comprehend how culture undergoes "reproduction," it is essential to understand which genetic information is contained within cultural genes and how it is paired and combined. The cultural gene lineage diagram, through collecting and organizing distinctive cultural genes of Henan's Yellow River, forms a comprehensive map capable of recording information about Henan's Yellow River cultural heritage. Hence, constructing the cultural gene lineage diagram can lucidly illustrate cultural genes' content, characteristics, and interrelationships.

The inheritance and expression of "cultural genes" must rely on "gene carriers" to be achieved. In response to different forms and states of carriers, they can be classified into

three categories: dominant, recessive, and carriers of behavioral activity. Among these, cultural gene dominant carriers refer to tangible material carriers created and established by humans, such as water conservancy projects, ancient architecture, and stone carvings; cultural gene recessive carriers pertain to carriers that lack tangible forms but can record and display cultural information through non-material means, like institutions, arts, history, folk beliefs, and more; cultural gene carriers of behavioral activities refer to a series of cultural activity carriers formed under the guidance of conscious ideas, such as ritual activities, festivals, craftsmanship, and technologies.

This article classifies cultural genes into material and non-material categories based on their attributes and logical relationships. In specific expressions of genes, material cultural genes are manifested through the dominant carriers of cultural genes. In contrast, non-material cultural genes require expression and transmission through the recessive carriers and carriers of behavioral activities of cultural genes. This categorization also applies to constructing the Henan Yellow River cultural gene lineage, distinguishing between material and non-material cultural genes.

#### *4.2 Taxonomy of genetic types in Henan Yellow River cultural heritage*

The cultural gene lineage diagram serves as a genetic information chain carrying the regional cultural system, where the genetic information along the chain undergoes exchange, recombination, and mutation to facilitate the propagation and inheritance of cultural genes. In the context of the historical development of the Yellow River, water has nurtured a diverse cultural system, with the core and essence of Yellow River culture being the "water culture." This "water culture" can be identified as the cultural origin of Henan's Yellow River cultural heritage, making water culture a fundamental feature for the transmission and evolution of Henan Yellow River cultural genes. The method employed in this study to construct the cultural gene lineage diagram establishes an inherent logical relationship between genetic information and the cultural origin, specifically the affinity of "water" culture within Henan Yellow River cultural heritage. Extracted cultural genes are categorized into three components: core genes, attached genes, and hybrid genes.

Core genes profoundly influence Henan Yellow River culture, characterized by their unique identification and dominant position within the Henan Yellow River cultural system. They serve as the matrix for the formation and derivation of other cultural genes in the genetic and cultural lineage diagram, and their absence would hinder the formation and propagation of Yellow River culture. In the context of Henan Yellow River cultural heritage, core genes directly embody the characteristics of water culture and maintain the closest connection with it. The Yellow River, its river channels, ancient sites, historic buildings, modern and contemporary landmarks, inscriptions, and hydraulic engineering with tangible forms collectively constitute the immovable water cultural heritage and form an integral part of the core genes in the cultural gene lineage. Examples include the Yellow River itself, its river channels, the Xiaolangdi water control project, the Sanmenxia central hydraulic hub, Jiayin Temple, Jidu Temple, Yuhuang Temple, Longma Foutu Temple, and Suoshuige, among others.

Adherent genes refer to the portion of genes that attach to the core genes, serving as extensions of the core genes. Adherent genes constitute a specific type of cultural gene that resides within particular carriers. They play a role in enhancing the distinctive features of Henan Yellow River culture, imparting greater recognizability to its characteristics while also maintaining a close correlation with water culture. For instance, within the realm of material cultural genes, elements such as Jiayin Temple and Zhenhe Iron Rhinoceros reflect distinct features; within the domain of non-material cultural genes, the singing style of the Yellow River anthem, engineering, and management techniques in Yellow River governance practices, stories, and ethos emerging from the Yellow River governance process—all fall under the category of adherent genes.

*Hybrid genes* are newly formed genes resulting from the amalgamation of multiple cultures across various carriers. While not unique to Henan Yellow River culture, they preserve gene types encapsulating distinct cultural and historical information from different periods. These genes constitute an integral component of the inheritance of Henan Yellow River culture. Examples include flood control projects, irrigation systems,

urban and rural water supply and drainage projects, soil and water conservation projects, and landscape hydraulic engineering.

#### *4.3 Educational dissemination pathways of Henan Yellow River culture genes*

Based on the classification mentioned above of cultural genes, distinct educational dissemination pathways can be adopted for different gene types:

##### **4.3.1 Refining cultural symbols and cultivating a cultural education dissemination brand**

At the level of core genes, the primary focus should be on protective policies, as the loss of core genes would result in the cultural essence being compromised. Furthermore, efforts should be directed towards enhancing the predominant position of core genes within cultural applications, enabling them to fulfill their leading role effectively. In practical applications, the extraction and refinement of cultural symbols should be contemplated, facilitating their integration into the cultural industry and thus realizing their cultural brand value.

##### **4.3.2 Implanting cultural symbols to enhance the distinctiveness of cultural education dissemination**

Attached genes rely on core genes as carriers and possess distinct identifiability. First and foremost, it is essential to reinforce protective measures for attached genes. Additionally, a greater emphasis should be placed on implementing cultural symbols. Extracting gene symbols and comprehensively integrating them into cultural products and spaces through the implantation of cultural symbols represents the most effective approach to transforming cultural resources into cultural capital for revitalizing and developing cultural genes.

##### **4.3.3 Symbiosis of cultural symbols: facilitating effective cultural education dissemination**

Regarding mixed genes, a primary focus should be on protective policies, emphasizing better integration with core genes, enhancing their inherent transmission capacity, and promoting the effective advancement of cultural education dissemination.

In summary, the application of cultural genes involves two primary steps. First, a precise categorization of core, attached, and mixed genes should be established to identify the most crucial and fundamental cultural genes. The interstructural relationships among these gene categories must be defined. Second, tailored application strategies should be developed based on diverse cultural genes. These strategies should incorporate cultural genes extensively into cultural inheritance and preservation efforts, as well as into cultural tourism and creative product development within the cultural industries. This approach will enable these genes to shine and thrive in constructing spiritual civilization within modern society.

## **5. Discussion and Conclusions**

Current research on cultural genes mainly revolves around discussions on concepts, meanings, domains, and characteristics, with limited in-depth exploration of specific professional fields. Many scholars have approached the study of cultural heritage inheritance from the perspective of cultural genes, shedding light on models for cultural heritage transmission and development. However, there needs to be more emphasis on extracting cultural genes and identifying suitable paths for gene inheritance. Even breakthroughs in cultural heritage preservation remain confined to specific localized areas, addressing only isolated "points." The study of linear cultural heritage protection from the viewpoint of "cultural genes" remains a gap in the current research landscape.

Hence, this paper takes "cultural genes" as the central theme, utilizing Henan Yellow River cultural heritage as a carrier and aiming for theoretical innovation in cultural heritage protection research. Drawing inspiration from biological genetics, the study organizes and categorizes Henan Yellow River cultural heritage, establishes an initial population of Henan Yellow River cultural element instances, and condenses and extracts Henan Yellow River cultural genes. This effort leads to constructing a genetic lineage for Henan Yellow River cultural heritage, delving deeper into exploring cultural heritage preservation, inheritance, and utilization. With a comprehensive exploration of temporal and spatial dimensions from a systems perspective, this study represents a novel and integrated approach that encompasses "watershed cultural heritage

protection," "cultural gene excavation and classification," and "heritage preservation and utilization."

In future research, building upon the foundation of cultural gene extraction and application strategies, a balanced integration of quantitative research methods will be employed to delve further into the sensory genes of Yellow River culture. This will involve refining and formulating more targeted cultural gene education and dissemination pathways to achieve multimodal transmission and preservation of Yellow River cultural heritage.

Throughout history, the Henan Yellow River has left behind a wealth of vibrant cultural heritage. In its future development, Henan should seize the significant national strategic opportunities presented by ecological conservation and high-quality economic development within the Yellow River basin. Additionally, Henan should capitalize on the opportunities arising from the national emphasis on Yellow River Cultural Belt construction and the development of cultural and creative industries. Leveraging its resource advantages in Henan Yellow River cultural heritage, the province should strengthen the organization and preservation of cultural heritage. This can serve as the foundation for cultural gene inheritance and development, enabling creative cultural development and brand establishment. Thus, a distinctive strategic approach to developing Yellow River culture can be explored.

The structural relationships among intricate cultural elements can be elucidated through the extraction of cultural genes from the Henan Yellow River cultural heritage and the construction of gene lineages. This process yields scientific methodologies for replicating and applying cultural genes, which facilitates the creative transformation of Yellow River culture into the cultural industry. Furthermore, by employing gene lineages, Henan Yellow River culture can be traced back to its origins, and associated information can be collected, analyzed, and integrated through lineage charts. This approach aids in identifying valuable cultural elements and offers theoretical guidance for excavating cultural genes in our country's linear cultural heritage, restoring historical memory, and promoting cultural inheritance.



## References

- Bi Mingyan. (2011). *Research on Inheritance Path of Rural Cultural Genes: A Case Study of Villages in Jiangnan Region*. Suzhou: Suzhou Institute of Technology.
- Bi Wenbo. (2001). Outline for Thinking About Several Issues of Contemporary Chinese New Cultural Genes. *Journal of Nanjing Political College*, (2), pp. 27–31.
- Chen Qianwen, Hao Xinyi. (2019). Research on Inheritance Path of Ancient Town Regional Culture from the Perspective of Cultural Gene: A Case Study of Zhuxian Town in Kaifeng. *Urban Architecture*, 16(306), pp. 155-158.
- Conzen, M. R. G. (2011). *Analysis of Urban Plane Patterns: A Case Study of Annicke in Northumberland*. Beijing: China Architecture & Building Press.
- Dawkins, R. (1976). *The Selfish Gene*. *Quarterly Review of Biology*.
- Feng Pei'en, Chen Yong, Zhang Shuai, & Pan Shuangxia. (2002). Conceptual Design Based on Product Gene. *Journal of Mechanical Engineering*, 38(10), 1–6.
- Gong Yu. (2019). Composition of Cultural Heritage and Construction of Genealogy in the Wuxi Section of the Grand Canal. *Journal of Wuxi Institute of Commerce*, 19(6), 46–51.
- Government of China. (2021). *Outline of the Ecological Protection and High-Quality Development Plan for the Yellow River Basin*. Central People's Government of the People's Republic of China. Retrieved from <https://www.gov.cn/gongbao/content/2021/content>
- Henan Yellow River Network. (2023). *Cultural Yellow River*. Yellow River Conservancy Commission Henan Water Resources Bureau. Retrieved from <http://hnb.yrcc.gov.cn/>
- Huo Yanhong. (2017). *Research on Protection of Hydro-Cultural Heritage of the Beijing-Hangzhou Grand Canal from the Perspective of "Cultural Gene."* Tianjin: Tianjin University.
- Liu Changlin. (1990). *Chinese Systemic Thinking: A Perspective on Cultural Genes*. Beijing: China Social Sciences Press, pp. 1–2.

- Liu Peilin. (2011). *China's Traditional Settlement Landscape Gene Map Construction and Application Research*. Beijing: Peking University.
- Liu Zhihui. (1998). Exploration of Knowledge Genes. *Information Studies: Theory & Application*, 021(004), 254–256.
- Pei Peiran. (2018). *Research on Protection and Planning Strategies of Chongqing Ancient Towns Based on Cultural Genes*. Chongqing: Chongqing University.
- Robert Pollack. (2000). *Decoding Genes: Information from DNA*. Beijing: China Youth Publishing House. (10).
- Song Changshan. (2020). Composition and Genealogy of Cultural Heritage in the Jiangsu Section of the Grand Canal. *Border Economy and Culture*, 8(200), 94–97.
- Tai Ligang, Zhong Tingxiu. (2007). Research on Product Instance Population and Product Gene. *Journal of Shanghai Jiaotong University*, 41(9), 1465–1469.
- Wang Pingxi. (2017). Protection and Development of Traditional Ancient Towns Based on Gene Implantation Concept: A Case Study of Shangyao Ancient Town in Huainan. *Urban Issues*, (03), pp. 43–48.
- Wang Yinghua. (2022). Composition and Protection and Utilization of Yellow River Water Conservancy Heritage. *Journal of Yantai University (Philosophy and Social Science Edition)*, 35(6), 78–89.
- Wang Yunxia. (2010). Concept and Classification Analysis of Cultural Heritage. *Theoretical Monthly*, 11, pp. 5–9.
- Xi Lisa, Liu Jianchao, & Wang Minghao. (2019). Genealogy and Value Inheritance of Urban Multiculturalism. *Urban Development Research*, 26(09), 1–5.
- Xu Jieshun. (2008). Cultural Genes: Five Perspectives on the Transition from Diversity to Unity of the Chinese Nation. *Journal of Hubei University for Nationalities (Philosophy and Social Science Edition)*, (03), pp. 9–14.
- Yang Mei, Wang Jing, & Zhang Yuankun. (2019). Research on Qingdao Cultural and Creative Product Design Based on Evaluation of Marine Cultural Genes. *Packaging Engineering*, 40(06), pp. 21-27.

- Yuan Yuan. (2013). *Research on Protection and Renewal of Historical Blocks in Taiyuan Old City from the Perspective of Cultural Gene*. Xi'an: Xi'an University of Architecture and Technology.
- Zhang Bin. (2021). *Research on Protection and Inheritance Strategy of Langzhong Ancient City from the Perspective of Cultural Gene*. Changsha: Hunan University, pp. 18–19.
- Zhang Yi, Hong Zhu. (2021). Canal Visual Cultural Gene Model Construction from the Perspective of Intangible Cultural Heritage Inheritance. *Journal of Nanjing University of Science and Technology (Social Sciences Edition)*, 34(2), 31–35.
- Zhao Heling, Wang Jun, Yuan Zhongjin, Ma Tao. (2014). Construction and Inheritance Path of Cultural Gene Pedigree: Taking the Cultural Gene of Ancient Dian Kingdom as an Example. *Modern Urban Research*, (5), pp. 90–97.
- Henan Yellow River Culture Research Group. (2020). *Cultural Genes of the Yellow River in Henan*. Yellow River Conservancy Press.
- Henan Yellow River Culture Research Group. (2022). *Genetic Classification of Henan Yellow River Culture*. Yellow River Conservancy Press.
- Wang Wei. (2016). *Research on Cultural Genes of Water Conservancy and Civilization*. Beijing: China Water & Power Press.
- Zhang Meng. (2018). *Research on the Inheritance Path of Regional Cultural Genes in Sichuan's Ancient Towns*. Southwest Jiaotong University.

---

### **Copyrights**

Copyright for this article is retained by the author(s), with first publication rights granted to the Journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (**CC BY-NC-ND**) (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).